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Community **FOOD PRESERVATION CENTERS'**

Miscellaneous
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COMMUNITY FOOD PRESERVATION CENTERS

Prepared by
BUREAU OF HOME ECONOMICS

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COMMUNITY FOOD PRESERVATION CENTERS

COMMUNITY FOOD PRESERVATION AND DEFENSE

Community food preservation—families getting together in a neighborly way to can, brine, preserve, or store an oversupply for a coming need—is as old as America and as new as all-out defense.

In normal, peaceful years, it is one of this country's thrifty means of securing an all-the-year-round supply of good food. It has been proved a good way of tiding over droughts and depressions and meeting such food emergencies as are caused by floods and hurricanes. Now comes a new chapter in the food preservation story, the rallying of all America to conserve the Nation-building food supply as a vital part of our national defense.

What the Food Preservation Program Means

For the family.—Food preservation is an essential part of an all-the-year-round home food plan which will keep family members as healthy in January as in garden-growing June. Any family now can get expert advice on budgeting foods for nutritional needs.

For the community.—Food preservation is part of a community-wide plan, to help spread food of high nutritive value so that the family of low income may grow strong and healthy along with those who can afford to buy the best foods. This may mean forming informal community canning circles, where the pressure canner goes around and families swap notes on other food preservation methods. It may mean families getting together for community locker storage. If community fruit and vegetable surpluses are large, it may mean the setting up of permanent or temporary community food preservation centers, with a paid supervisor or manager, the keeping of competent records, the conducting of canning operations according to accepted standards of processing, safety, and sanitation, and serving as information clearing house or actual base of operations for distributing fresh surpluses, or for drying, freezing, and other means of storage. Community upbuilding has been quickly evident when such food preservation has been undertaken.

For the county.—In some places, particularly where centers are set up in connection with schools, the county is used as a unit. The

county food preservation center is established at some central place, and trucks go out from it to bring in the food supplies from the community and the school gardens. The products are distributed to needy families and to schools where lunches are being served. The food defense program will broaden the use of these centers.

For the State.—In every State there is available from some source a suggested food budget. This describes the home food-supply program on the basis of the home State products and often furnishes suggested diet plans by which the people can find out whether or not their home food measures up to a satisfactory level of nutrition. Often families definitely “sign up” for a program which includes doing their share of food preservation, and receive certificates of recognition for a year’s work well done.

For the Nation.—The community food preservation program has a double advantage, long-term and emergency. It steadily builds up the health and strength of the people. It also provides potential food supplies for emergencies and gives the people of a community practice in working together so that they are better prepared to meet any sudden emergency. The Federal Government therefore furnishes the help and guidance of its food experts in this program. It has set up a yardstick of good nutrition as a national goal and has translated this into meal plans at cost levels from low to liberal so the people can measure their daily diet against an accepted standard.

Defense Food Preservation Plan

The defense food preservation plan is briefly this: Local defense councils, local nutrition committees, county agricultural agents, home demonstration agents, Farm Security Administration supervisors, and representatives of other Government agencies concerned with the food-supply aspect of defense will get together in every community and take stock of the fruit and vegetable requirement and supply. They will get volunteers from local civilian defense organizations to help collect, distribute while fresh, or preserve surplus foods.

Any Nation-wide effort to preserve food is complicated by the same national emergency which makes a food preservation program necessary. A readiness to adapt as necessity arises is a part of conducting a community food preservation project.

This Handbook’s Place in the Picture

This handbook is designed to help in community food preservation, particularly when it becomes a big enough project to call for setting up a center. Such a project presents a real problem and

cannot be considered merely as doing on a larger scale the same things that are being done at home. Competent supervision and businesslike methods are absolutely essential to success.

This handbook is a revision and enlargement of the booklet on Community Canning Centers distributed by the Bureau of Home Economics for many years. It combines the research results in the Bureau of Home Economics laboratories with the practical experience of all Federal agencies working in the food preservation field.

PRELIMINARY PLANS

The community food preservation center is to be considered as a local clearinghouse for the smaller food surpluses which are not moved about the country in carload lots. Its work begins where that of the commercial canner leaves off. It takes in the produce that the grower cannot find a market for, the surplus of home gardens, and any not-quite-perfect fruits and vegetables in sound condition left after the picking for commercial canning. It may also process meat surpluses.

Centers may well be used not only in actual preservation processes, but also in giving information that will help families to conserve their food supplies. These broad purposes should be kept in mind when the center is being set up.

Leadership

Never before in our history has this country been so well organized to furnish competent leadership for community food preservation centers. Agricultural agencies are available for locating the surpluses. Nutrition committees are set up to do over-all planning on the long-range object of these centers—the upbuilding of the national strength through better use of food supplies. The civilian defense organization enrolls volunteers for service in food conservation. Communities have their women's clubs, civic clubs, youth groups, consumers' organizations, labor unions, to help solve financing and transportation problems. Instruction in canning and preserving is given in rural areas by home demonstration agents, home supervisors, and vocational home economics teachers. In towns and cities and also in rural areas, canning is often carried on with the help of the WPA, particularly in connection with the school-lunch and school-gardening programs.

Initiative for setting up a center may be taken by some one interested individual—such as a civic leader—or a public-spirited group. Usually it is wise to work with and enlarge what already is set up in-

stead of starting new. Visits to successful centers where feasible and seeking the experience of others in kindred fields will be of great value in the preliminary stages of planning a center. Study the needs and resources of your community. The following paragraphs will suggest or lead to other information avenues:

State and county nutrition committees.—Nutrition committees have now been organized in every State to stimulate all phases of better nutrition. On these committees, by virtue of their office, are the State extension service agents, State FSA home supervisors, State WPA supervisor of the school-lunch program, and others working with the practical problems of food. This organization is rapidly being extended into the counties.

State and local defense committees.—These organizations, usually appointed by governor and mayor, are well organized and are working closely with the Federal Office of Civilian Defense. They stand ready to help with defense aspects of conserving the food supplies and will be helpful in securing volunteer workers.

Gardening and food preservation program of WPA.—This program, usually organized on a State-wide basis, and including many canneries of near-commercial proportions, as well as smaller centers equipped with home type of canning equipment, is a valuable source of practical advice, and a promising reservoir of trained managers for food preservation centers. Under certain specified conditions, WPA funds may be available to help finance food preservation centers. This may be done under a new plan set up for defense purposes and fully explained later in this handbook, the manager to be paid by WPA, the workers to be volunteers.

The Surplus Marketing Administration stands ready to furnish such surpluses as it may have available to centers equipped to can produce that comes in truckload and carload lots where the product goes to the school-lunch program, institutions, and families on relief. See your county welfare agencies as to whether or not surplus commodities may be available in your locality.

Land use planning committees, often called county planning boards, are functioning all over the land, working on the problems of the available food supply.

The Extension Service of the Department of Agriculture, which did the pioneer work in the field of community canning, is widely looked to for leadership in rural areas and still stands ready to furnish, through its home demonstration agents, scientific advice and assistance to homemakers' clubs and groups of housewives in rural areas. Consult your county home demonstration agent or write to the central office at your State Department of Agriculture.

Farm Security Administration home supervisors have, as a practical matter of help to low-income farm families, a large and carefully

worked out food conservation program, sometimes done on a community basis. Talk to your county home supervisor.

The Rural Electrification Administration has more than 800 electric systems which will finance loans to schools at low interest rates for equipping food centers. These kitchens will also be used for school lunches and adult-education classes in nutrition.

Vocational schools sometimes conduct community canning centers in their school plants. Visit your vocational school.

Civic clubs.—Your local newspapers will give you the roll call of clubs in your home community. This country has hundreds of them, valuable in organizing, financing, publicizing, and recruiting volunteer workers. A new spirit of rural-urban cooperation has arisen in women's clubs. In many places, city women gather up their used fruit jars for country women to use in conserving their products. Again, urban club women have gone before State legislatures to secure appropriations for rural canning projects. Garden clubs are often especially helpful.

Youth organizations.—Any project goes with more zip and zest when young people help out. Again the local paper is key to the youth organizations available for errand running and distribution activities. Four-H clubs and the NYA sometimes can for the school-lunch program.

Food preservation today is a cooperative and neighborly job for everyone in the community. The more all feel that the job and the center where it is done belong to the whole community, the better. There should be no duplication and no rivalry.

The Advisory Board

Suppose the preliminary investigation of the question, "Why not our community?" has brought about a general conviction that a community food preservation center would be a sound proposition for the general good. Early must come the selection of the advisory board, which plans a way to finance and operate the center. The local nutrition committee will give technical advice. Certainly the nutrition committee functioning in a community might logically regard the community food preservation center as a general headquarters and information clearing house.

Personnel

An advisory board should be selected by taking into consideration the types of experience to be included and the agencies and organizations to be represented.

In the same way that newspapers sometimes select an average citizen or a typical family, a group of women with long experience in food

preservation operations on a State-wide basis pooled their experiences to set up what they considered an ideal board. Their conclusions are given here simply for what help their experience may be to those just starting on a food preservation venture. Their ideal advisory board would consist of:

A businessman or businesswoman.—Someone of practical financial judgment and experience to head up the over-all job of financing the center. This must include the ability to figure costs on equipment, replacements, and long-range upkeep.

A nutrition person.—If not an actual specialist in that field, someone who thoroughly understands the subject. Where possible one who has had experience with large-scale canning operations. It might be a retired home demonstration agent, a home supervisor, or a vocational home economics teacher. This person would serve as food consultant to the manager or supervisor of the food preservation center.

Someone trained in agriculture.—This might be the county agent, the vocational agriculture teacher, a person of gardening and canning experience in the WPA program. This person would give the manager or supervisor of the center advice on sources of supplies.

Civic leader and organizer.—The province of this person would be to arouse enthusiasm in the project and keep the morale high. A club woman with experience in public speaking and in generally publicizing community projects would be excellent.

A person of engineering training or practical mechanical experience.—The province of this person is to give the manager or supervisor practical plant-running and plant-repairs advice. Someone with experience in commercial canning would be especially valuable.

A parent-teacher association representative.—When the products of the center will be used in school lunches this member's job is to keep in touch with the schools. If part of the product goes to low-income families, the local welfare authorities should be represented.

A youth leader.—If such groups as Boy and Girl Scouts and 4-H Club members are going to help by bringing food into the center, these groups should be represented on the advisory board.

Advisory boards will of course be adapted to the communities they serve. Every community knows the general qualifications for such work and will look for civic-minded persons who possess the qualities of leadership and who have a real interest in furthering the objectives of the project. They will be the sort of people who can be depended upon to meet regularly and have a carefully planned program in order to do effective work. It is completely possible to consider that all of these general qualifications may be happily combined with specialized professional and business experience of value to community food preservation. Every community has unrealized human assets. Look for them.

The Board Decides

It is to be remembered, in considering the duties of the advisory board, that a community food preservation center is a going business concern for the important purpose of defense and has a considerable money investment in equipment. In times past canning equipment has sometimes been destroyed or lost because "everybody's business was nobody's business." It is the duty of the board to elect officers, make decisions, and keep records on all its proceedings and property.

Purpose of the center.—The board determines what the individual food preservation organization will handle and on what scale with regard to the distribution of fresh products; the canning, drying, and brining of surpluses; the storing both of the canned, pickled, or dried products and of the root vegetables that will keep during the winter; what use may be made of refrigeration.

Source of supplies.—The board must work out with the help of agriculturalists what quantities of what commodities will be available. Commercial canneries get families to sign up; it is just as important for your food preservation venture to find out the support it is going to get from the food-producing community.

Means of collection and distribution.—If the families of the community are interested, if they are willing to support the center, will they be able to bring in the food surpluses or will it be necessary to set up some collection routes? If your center is to serve schools or low-income families, how will the fresh or preserved foods be got to them?

Selection of paid person to run the center.—People with long experience in preserving food on a large scale for the general good of a community consider a paid manager or supervisor, responsible to an advisory board on a strictly employer-employee basis, as one of the first essentials to the success of a center. This makes it possible to have a trained person directly responsible for keeping the center up to standards of food handling and sanitation, for having someone on supervisory duty at all times the center is in operation, and for turning the place over in good condition at the close of the season.

Deciding Type of Centers

Community food preservation centers now in operation range all the way from homes with a base of neighborhood operations in the back yard to former commercial canning and refrigerator plants that have been taken over by the community. They include use of church and community kitchens and home economics laboratories; converted store buildings, laundries, and creameries. In one State so many communities have built their own plants that the State agricultural college sends out a pamphlet of building plans, based on

practical experience. Equipment ranges from home-size pressure cookers and vats made by the local blacksmith to hotel- and factory-size retorts with an investment of thousands of dollars. Some centers serve individual families; some, the schools and institutions of a county; some, large sections of low-income population. Products are varied by geography; processes by food habits. Out of this great variety some helpful generalizations may be drawn.

Size.—The best way to figure out the size of a center is to use two well-known factors of the food front—nutritional need and surplus supply. The idea isn't simply to can for canning's sake, nor store to fill bins, nor freeze to fill lockers. It is to set up food resources that can be drawn upon to keep diets up to yardstick levels. This is done by simple arithmetic. Define your various problems. A quart can makes eight half-cup servings for school lunches. How many quarts of this fruit and that vegetable should be canned or dried to supplement the fresh supply that will be available in order to give the children on our school-lunch program their fruit and vegetable quota for the year? That sort of down-to-earth figuring is the practical key to capacity. In one State, nutrition classes in the State university worked out the school-lunch food budget to the point of planning every meal.

Equipment lists in this handbook are based on four different sizes of canning plants by daily output—250 cans, 500 cans, 750 cans, 1,000 cans; two floor plans are also suggested. Write to your State college of agriculture for your State food budget and to the United States Department of Agriculture for the bulletin, *Diets to Fit the Family Income*, as guides for setting up a center of capacity to fit the community food needs.

Starting small and growing large is a good American way of doing things. Many a center has started in an old store building and grown so large it built a home of its own.

Scope.—Your center may be set up to serve families who want to bring their own stuff in and preserve it themselves. It may be one in which volunteers will work for the school or for the community as a whole. Or its workers may preserve for themselves and leave part of their product to help others. Work out with local school and welfare authorities the way in which the product of your center will fit into food needs, and in what quantities.

Volume.—Careful estimates should be made of amounts and kinds of surpluses it is anticipated will be distributed in a fresh state, and those that will be preserved by various methods—canning, drying, brining, storage at ordinary temperatures, and various methods of cold storage.

Purpose.—The purpose of a community food preservation center is to provide more food for better nutrition; to make equipment available for those not able to own it; to provide opportunity for less

experienced persons to work under supervision on food preservation processes; to give volunteers practice in working together for the good of the community.

Policies.—The policies of operation will vary according to the center, the way it was set up, for what purpose, the financial arrangement, the sponsor contribution. These policies should be decided upon by proper authorities according to the needs of the particular center. Suggestions are offered for several plans that have been found successful.

1. The food preservation center is furnished by a sponsor. Any person living in the community to be served, by furnishing food, cans or jars, and labor, has the use of the center by complying with the rules governing the center.

2. At centers where labor can be secured on either a volunteer or paid basis the canning may be done by the center for families who wish to furnish produce and cans without labor and in exchange allow the center to retain from 20 to 40 percent of the canned food in payment. This share or toll may be contributed to the school-lunch project or local institutions.

3. As a food defense measure, the sponsor furnishes the center, equipment, and cans; public-spirited people furnish the produce and labor for canning to provide a supply of canned food for school lunches, needy people, institutions, and camps. Such a canning program might be expanded to include a garden program which would provide the products for canning.

Figuring the Costs

Housing.—Some of the questions that come up are: Can you get the use of a building free by paying the operating costs? Will you have to pay rent? Does your project justify erecting a building? A bulletin on the construction of community canning plants, put out by the University of Georgia, presents three plans for that locality on which construction costs, exclusive of labor, range from \$650 to \$850.

Equipment.—Lists of the equipment needed for the various food preservation processes for various-size centers are included in this handbook in table form. Having figured out from them the equipment needed, find out how much of it you can get the use of on a loan or donation basis; how much you can have home-made; how much you will have to buy. In the field of home-made equipment the ingenuity of the American people can have full swing. Equipment that must be purchased may be figured by obtaining prices from any of the firms listed in this handbook. The Georgia Extension Service estimates that for various-size centers, cost of heavy canning equipment ranged from \$250 to \$1,000; that of large utensils from \$37 to \$90; that of small utensils from \$22 to \$44.

Salaries.—Where a community completely finances its own center, the salary for the paid supervisor is one of the important items to be

considered. If the WPA-manager system is used, WPA pays the manager. Other paid workers may be necessary.

Transportation.—In the main, transportation costs probably will be covered by people bringing in their own products, or volunteers furnishing cars. But it may also be necessary to hire a truck and driver. Don't forget to figure in that possibility. In projects employing WPA labor, it is sometimes possible to secure the use of WPA trucks.

Other expenses.—Thinking all the way through the project as you are planning to set it up will indicate your overhead, upkeep, and running expenses—light, heat, servicing, even the books to keep the records and paper slips to hand out to the customers when they bring their products in.

Methods of Financing

Because community food preservation centers are a vital part of the national defense effort, many public-spirited citizens will be interested to the point of aiding them financially. There are two principal methods of approaching the financing:

By the community only.—In small and informal ventures costs may be prorated among the families served. If a real center is to be set up, its promoters may put their plans before the local board of county commissioners or the chamber of commerce. If a school-lunch program is the aim, the board of education may give it backing, or the parent-teachers association may help out. Voluntary contributions may be solicited. A philanthropic individual may be interested. Club women may make it one of the projects of their organization.

When the community finances its own center, use of canning equipment and even of containers has sometimes been given outright to those who use it. More frequently the users share somewhat in the costs under a fee or toll system. A proportion of the products canned, or a certain amount of labor, has been required from persons who bring in their own products to be canned for their own use.

Problem of toll.—The toll system, taking a percentage of the finished product to pay for use of plant, is not used by WPA because it operates to the disadvantage of those whose need is greatest. However, it has been found a workable system in many communities. If toll is to be used in the financial scheme, the system should be set up in a fair and well-thought-out fashion. At present, tolls vary all the way from 20 to 50 percent of the product. Actual values involved should be figured, with labor and products as well as cans given their just values in the exchange.

With WPA help.—Community food preservation centers may be set up under two different WPA plans: Projects in which WPA furnishes all the labor and the sponsor shoulders all other costs; and

projects in which volunteers do the labor and WPA pays the manager.

In order to use trained personnel in serving a larger part of the community, through the use of volunteer help, WPA is emphasizing the community food preservation unit plan. Whether or not such help is used in projects where individuals can for their own use depends entirely upon the local sponsor. There must of course be an official sponsor, such as a city, county, school board, or welfare board.

The way to find out whether or not your community food preservation center may be of the type which can qualify for some WPA help, and can be so set up to use it under the WPA hour and other limitations, is to go to the nearest WPA office and explain your project. Tell the person in charge there that 20 women, or 50 women, or whatever your number of volunteers may be, want to can for their own use, or for the school-lunch program, or for needy people in the community. If your project is feasible within the local resources of WPA and the rules laid down by Congress, your mission is hopeful.

Since it is anticipated that many community centers may be able to make specific use of the broad food preservation experience of the WPA, a memorandum prepared by WPA on the help, financial and otherwise, which they are prepared to offer, is here included.

WPA Assistance Available

The Work Projects Administration is responsible for providing employment for needy people on projects of useful public nature. Any projects placed in operation must conform to the regulations established by Congress in the Appropriation Act of 1942. Among the most important of these provisions are those which require an over-all sponsor's contribution of 25 percent for all projects, within certain categories, and allocate funds which will permit the total employment of approximately 1,000,000 persons. Within the above enumerated restrictions, however, the WPA is prepared to offer assistance to any locally sponsored food preservation program in the following ways:

Preliminary planning.—Trained home economists employed on WPA school-lunch or garden and food preservation projects will be glad to assist local groups in planning a community food preservation center. Their experience in organizing advisory committees and in estimating cost of equipment and method of operation should be of value in such a program.

Labor.—Where WPA State-wide garden and food preservation and/or school-lunch projects are in operation, local public sponsors

may propose a food preservation center project requesting WPA assistance. This assistance may take either of the following forms:

1. A food preservation project operated by WPA labor. Under these circumstances the sponsor furnishes all nonlabor costs such as space, utilities, equipment and food containers, etc., and WPA provides supervision and labor to prepare, process, and store the preserved food.

2. A food preservation project managed by a WPA skilled worker who would be responsible to the WPA for the technical adequacy of the center and responsible to the sponsor for the operation of the center. Under these circumstances the sponsor furnishes all other than labor cost, volunteers perform the labor, and WPA pays the manager.

So far as WPA is concerned there are no limitations on projects of this nature. The assumption is that such a center would be used by a community for increasing the amounts and types of food for distribution to school lunches, needy persons, or other worthy purposes. It is the responsibility of the sponsor to determine who should use the center and to determine the conditions under which they may do so. All aspects of such a center except the technical are the responsibility of the sponsor.

Equipment.—WPA may provide certain items of equipment for community food preservation centers provided such equipment is not already available and if adequate justification for such purchases is presented. However, the amount of Federal funds approved for equipment purchases must fall within the prescribed category of WPA nonlabor costs.

The Work Projects Administration has operated many food preservation projects and has provided supervision for many community food preservation centers during the past 6 years. As a result of such activities the WPA believes that food preservation centers are of importance to communities, especially if WPA assistance is limited only to providing leadership or skilled management for operation of the projects.

In requesting WPA assistance, it should be borne in mind that such assistance can be given by WPA only where certified labor is available.

Training.—Arrangements may be made for participation in the in-service training connected with WPA food preservation projects.

Training Possibilities

Food preservation cannot be done by inexperienced people any more than food can be distributed in trucks by people who have never been behind a driver's wheel. In either instance, there are plenty of people in the United States who can teach the inexperienced. Down through the years, home demonstration agents have turned out a large crop of crack canners and preservers who can do a thoroughly competent job of teaching their neighbors. The WPA canning program and the FSA farm- and home-management

program have added hundreds more. Vocational schools, and the home economics courses in State agricultural colleges offer formal instruction and a source of supply of teachers, as well as of center supervisors.

Essentials of Success

Before actually setting up the community food preservation center, it might be well to consider for a few minutes what experience has taught others on the essentials for success in such a project. They were simmered down to three by a group which set themselves that problem:

1. Correct food preservation methods must be used.
2. Accurate records must be kept for the satisfaction of patrons of the center and to make possible evaluation of the services the center provides to the community.
3. The manager or supervisor must show a high standard of leadership and maintain high morale at all times.

Selection of Site and Building

In house-hunting for a community food preservation center, the fact that human food will be in process of preparation must be borne in mind at all times. It is also to be remembered that some food preservation processes are done at high temperatures. Whether or not the work can be done in comfort depends in a large measure on the building selected. The points to be considered are:

Location.—Choose sanitary surroundings free from rodents, roaches, and other insect pests. Entrances and exits should be easy of access for bringing loads of foodstuffs in and distributing processed products. Never choose the upper floors of any building for a food preservation center.

Size.—The building must be large enough to suit your purpose and to include storage space, dressing-room space, and adequate toilet and lavatory facilities for men and women workers. Dressing-room space includes space for lockers or racks for hanging street clothes when workers wear uniforms, or for hanging uniform aprons to cover street clothes. Garments should not be hung in rooms where food is handled.

Water supply.—Because of the large amount of water needed for safe and efficient operation of large-scale canning, running water is an absolute requirement. Both hot and cold running water should be available. The water must be from a supply approved by the State department of health. If the source is not a regularly tested city supply, tests should be made at regular intervals. Where there is no sewage system, water disposal is subject to approval by local health authorities.

Steam.—If there is in your community an abandoned bottling works, laundry, or creamery, their steam lines would greatly facilitate the canning process. Some centers have set up a steam boiler or piped steam in from nearby sources. Large pressure canners or retorts are heated most satisfactorily by steam under low pressure. Steam may also be used to heat water baths and provide hot water for general purposes.

When a series of retorts is connected with a single steam line, installation must be made by an experienced steam fitter.

All State and local laws governing the operation of boilers should be observed, and all boilers should be new or should be tested by an experienced boiler inspector before they are put into service, unless the owner can produce a certificate of inspection not more than 1 year old. Inspectors can usually be obtained from the nearest railroad terminal, if they are not otherwise available. Particular attention should be paid to testing the safety valves.

It is nearly always necessary to operate a boiler at from 75 to 150 pounds pressure if a number of retorts are connected to it. From 15 to 20 pounds is all that should be turned into any retort at any time, and the safety valve on the retort should not be set at more than 20 pounds.

Fuel.—Whatever type of fuel is used, check the building for just how and where installations are to be made. Special heavy-duty burners will be required for gas or oil stoves if steam is not available.

Particular attention must be paid to securing safe storage for oil and for handling it if it is to be used as fuel. Boilers in packing houses and canning plants are frequently fired with oil. All such installations should be thoroughly inspected before being used.

Ventilation.—This is particularly important in canning because of the amount of heat and steam generated. The room should have windows on more than one side to provide for cross-ventilation, and the tops of the windows should reach nearly to the ceiling. Many of the simpler rural centers have hinged panels or sides which are raised to give ventilation, light, and shade. Ceilings must be high enough to allow heated air to go up beyond the heads of the workers. If natural circulation is not sufficient, ventilating fans should be used. Inside rooms are not suitable for canning units unless adequate mechanical ventilation is provided.

Heat.—Provision should be made to maintain a comfortable working temperature at all times. In most locations fans are needed in warm weather. A porch for preparing foods for processing helps greatly in meeting the heat problem.

Lighting.—All working areas should be well lighted. Supplemental artificial light should be provided for dark days. Make plans to regulate cross lights and glare.

Safety.—The building should be in good repair with the roof, walls,

windows, porches, and floors in good condition; the floors sound, without holes, and sufficiently strong for the loads that will be placed on them. The porches and unloading platforms are particularly important. The flues and chimneys must be properly constructed and in good repair. The building should be inspected for any other fire hazards present, or conditions which might become hazards during the operation of the plant; also for insanitary conditions and fire hazards in any of the surrounding premises.

Sanitation

All State and local regulations on food handling should be observed. Where there are no strictly defined regulations, aid of the State department of health should be asked in establishing adequate standards of sanitation. Some of the sanitary considerations are:

Protection from pests.—All windows, doors, and other openings should be screened. Screens should be of fine mesh, fit tight, and be free from holes. Screen doors should be self-closing. Building construction should be such as to leave no harbors for rats and roaches. See the Department of Agriculture bulletins on control of flies, rats, roaches, and mosquitoes.

Protection from dust.—Dust is a source of food contamination. Roadways about the building should be paved, oiled, or otherwise treated to prevent dust. Look them over. Cloth curtains should not be used at the windows, since even the dust they collect may contaminate food.

Toilets.—Toilet rooms should be separated by a room or vestibule from rooms used for any canning process or for food storage. Plumbing must meet all sanitary regulations, and toilets and lavatories must be maintained in a sanitary condition. If outdoor toilets are used, they must be of approved construction and be located at a safe and convenient distance.

Floors.—Floors of receiving platforms or sheds and of all rooms used in food preservation processes should preferably be of concrete. They should be built to drain readily and should be smooth for ease in cleaning. For small food preservation centers, floors of wood with waterproof finish, inlaid linoleum, or other water-resistant finish may prove satisfactory.

Walls and ceilings.—A smooth, washable finish that can easily be kept clean and is not materially affected by steam is desirable. A light color is preferable to a dark one.

Surveying Sites Available

With all these points in mind, canvass all available sites in the community to find the one best suited to the purpose of a food preservation

center. Places where at least part of the equipment is already installed naturally should have first consideration. In a number of places the operator of a canning plant has permitted the use of his plant at a season when it was shut down or during certain hours when he was not using it. Community kitchens and home economics laboratories in the schools may be pressed into emergency use. If empty store buildings are available, they usually can be satisfactorily converted. In one instance a butcher shop was used, its built-in refrigeration plant making it possible to keep fresh foods in good condition for distribution and for canning. Building a screened porch on some available building for outdoor peeling, husking, and washing has proved practical in many places.

EQUIPPING THE CENTER

The production line is the shortest distance between raw material and finished product. In equipping the food preservation center, see to it that there is a smooth flow of people and processes from the front receiving desk to the storage room. Chief operations or way stations along this line will be:

For business operations.—A place for receiving and checking products, for routing them if they are to be distributed fresh, for keeping records and accounts. Bulletin boards for food and health posters and a circulating library of pamphlets on various methods of food preservation may well be linked up with this front-office part of the community venture.

For canning preparations.—A place for removing and disposing of husks, stems, and other gross waste; washing products to be processed. A screened porch is excellent for this part of the process.

For processing.—Washing glass jars or tin cans; grading and preparing products, disposing of waste; sterilizing glass jars if the open-kettle method is used; scalding or precooking products to be canned; marking tin or glass containers before processing; filling products into containers; sealing tin cans; processing nonacid products in pressure canner and fruits and tomatoes in water bath; cooling tin cans in running water and glass jars in air, out of draft. Processing timetable should be posted over canners.

For labeling, inspection, and storage.—Pasting on labels and looking each can over preparatory to storage or distribution. Plan storage in a cool dry place.

For plant maintenance.—Supplies and equipment must be at hand for the daily cleaning-up, inside and outside. Posters telling what is expected of workers in respect to keeping the plant clean and sanitary are a means of maintaining high morale.

Practical Pointers on Equipment

A list of the equipment needed for four plants of different capacities will be found in table 1. Floor plans for two types of plants, showing how the equipment may be arranged so as to keep the process flowing and avoid cross-travel, will be found in figures 1 and 2.

From experience in actual operations and from tests in research laboratories come the following practical pointers on canning equipment:

For Small and Medium Plants

In plants capable of handling up to 1,000 cans daily, the canning process involves steam-pressure canners such as are used in homes and

TABLE 1.—*Canning equipment list according to plant size*

Item	Capacity in No. 2 cans per 8-hour day			
	250-can capacity (very small)	500-can capacity (small)	750-can capacity (medium)	1,000-can capacity (large)
Approximate number of workers.....	7	14	20	30
Steam pressure canners.....	2 40-qt.	4 40-qt.	6 40-qt.	{ 3 hotel-size (90 qt.) retorts; 6 retort bas- kets; cranes for lifting. 5' x 2' x 1'
Water bath.....	2½' x 2' x 1'	2½' x 2' x 1'	5' x 2' x 1'	
Burners (gas or oil) or Stoves (coal or wood).....	4-6	6	8	
Sinks.....	2	3 or 4	2	4
Tables (4-6 ft. long):				
Receiving.....	1	1	1	1
Preparation.....	2	3	3	4
Filling and sealing.....	1	1	2	3
Labeling.....	1	1	1	1
Tin-can sealers.....	1	1	2	3
Buckets.....	2	3	4	8
Tubs for cooling.....	1 or 2	3	4	6
Shallow pans (6 qt.).....	6	12	16-18	20
Dishpans.....	2	3	4	8
Teakettles or large kettles.....	1	2	3	4
Kettles for precooking (12 qt.).....	2	3	4	8
Wire baskets or colanders.....	2	2	2	2
Funnels or can fillers.....	2	3	4	6
Ladles or dippers with hook or handle.....	3	4	5	6
Can lifters or tongs.....	2	4	6	8
Measuring cups:				
1-cup capacity.....	1	2	3	4
1-qt. capacity.....	1	2	3	3
Paring knives.....	4	6-8	10	12
Long knives (heavy).....	2	3	4	6
Forks.....	2	2	3	12
Tablespoons.....	2	4	6	12
Teaspoons.....	2	4	6	12
Long-handled spoons.....	2	3	4	6
Brushes for vegetables.....	3	6	8	10
Scissors (used to cut beans).....	2	4	6	6
Thermometers.....	1	1	2	2
Towels:				
Dish, daily per person.....	2	2	2	2
Hand, daily per person.....	2	2	2	2
Wash basins.....	2	4	6	8
Hot-dish holders.....	5	10	15	20
Brushes for cleaning.....	3	6	8	10
Brooms.....	1	2	2	2
Water mops.....	1	2	2	2

NOTE.—One each for plants of all sizes: Can opener, knife sharpener, clock, covered containers of salt, sugar, and pepper, long-handled dustpan, first-aid kit, drinking-water cooler, manager's desk (3 x 4 ft.) scales, garbage container.

other equipment and operations small enough in size and scope that lifting cranes and power machinery are not necessary. Probably much of the defense canning to save the food surpluses will be done in this smaller scale fashion. But simply because the undertaking is not of commercial-factory proportions, extra care must be taken to make sure that every piece of equipment is adequate to its task. If this is not done, spoiled and even dangerously contaminated food may be the result. The warning cannot be too often sounded that the preservation of food for human consumption is a serious responsibility.

Stoves.—The stove space must be sufficient for operating the maximum number of pressure canners and water-bath canners to be used and for other operations, such as blanching and washing and sterilizing jars. Heat must be sufficient to bring pressure canners to the required temperature in not more than 5 minutes; otherwise the quality of the produce may be impaired. For large canners it may be necessary to provide special heavy-duty gas or oil burners. A good coal range may be adequate, but is often undesirable because of the amount of heat radiated into the room. Individual burners set at a convenient height from the floor will facilitate the handling of canners. Heavy-duty

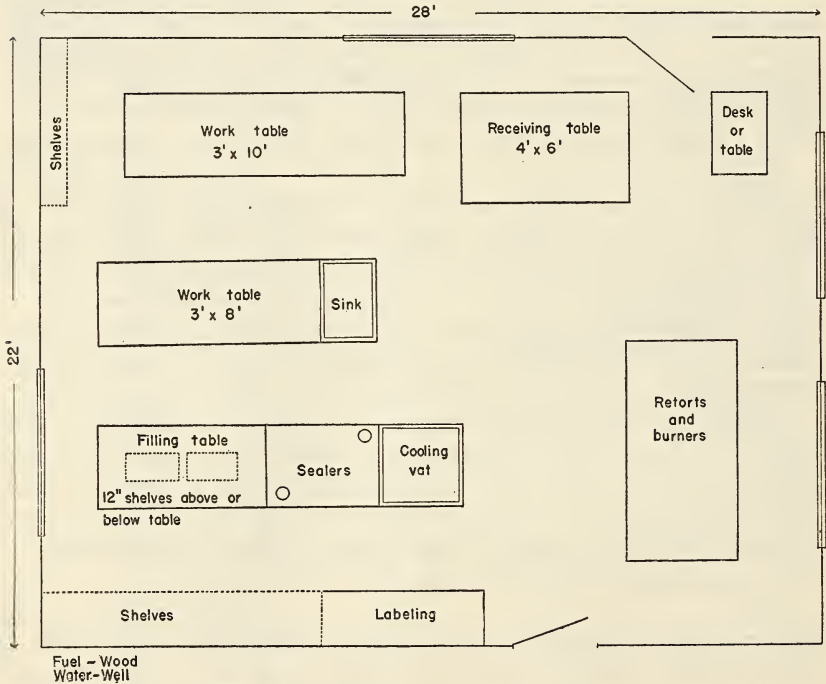


FIG. 1.—Suggested floor plan for canning center, 22 feet by 28 feet (Extension Service, College Station, Tex.).

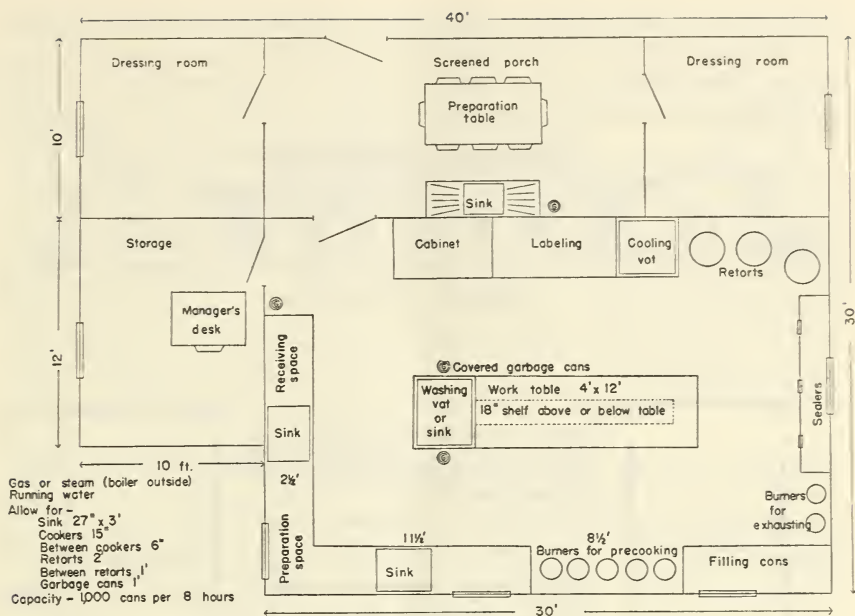


FIG. 2.—Suggested floor plan for canning center, 30 feet by 40 feet (Extension Service, College Station, Tex.).

burners equipped for burning oil or gas, also tanks of the fuel, are sold by some manufacturers of canning equipment. Iron frames for supporting the canners over the burners may also be obtained from the manufacturers, or they can be made by a blacksmith. The iron (3-in. by 3-in. angle iron) is forged into a ring having the inside diameter of the canner. Four legs made of the same kind of iron are bolted tightly to the ring. A 2- or 3-inch horizontal foot may be made on each leg.

If large gas or oil burners are to be mounted as close as 20 inches to the floor, the floor should be covered with a layer of hollow tile cemented together. If small burners are to be so mounted, the standard floor board consisting of a sheet metal cover over asbestos board is sufficient. The same protection should be placed under stoves.

Steam pressure canners.—Retorts or pressure canners are essential for processing meats and nonacid vegetables. This means all vegetables except tomatoes, pickled beets, sauerkraut, and ripe pimientos. Pressure canners must be strongly constructed to stand up under constant use. They must have steamtight closing and be fitted with pressure gage, safety valve, and petcock, and if possible with a thermometer that registers the internal temperature. The size selected should be in relation to the production of the unit. In small units, where a variety of produce must be canned on the same day, canners of different sizes may be desirable.



• FRONT • ELEVATION •

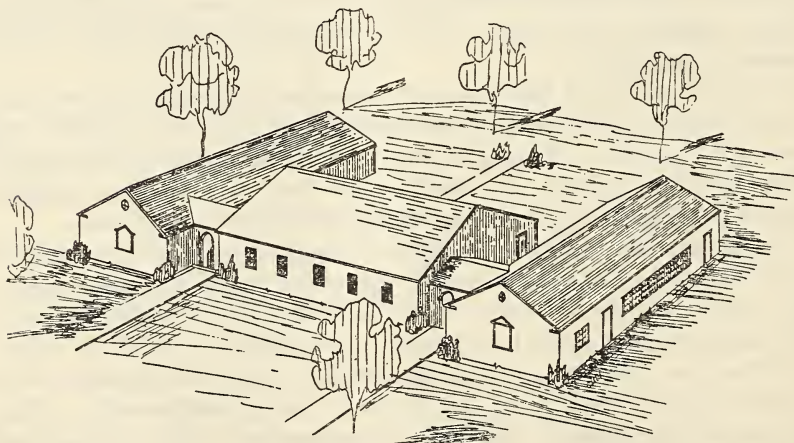
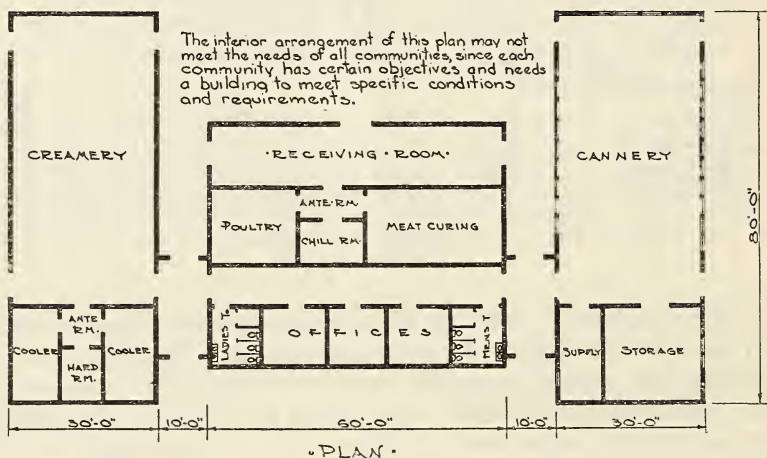


FIG. 3.—Community processing plant (Extension Service, Athens, Ga.).

Directions of manufacturers regarding operation and care of pressure canners should be followed to the letter. It is particularly important to allow steam to flow steadily from a factory-size retort throughout the processing period to prevent formation of air pockets, which reduce temperature.

Thermometer.—Since there is always the possibility of inaccuracy in gage readings due to faulty mechanism and the presence of air within the canner, it is recommended that a thermometer should be used in every instance. It is a simple matter to puncture the lid and insert from the inside of the lid a retort thermometer which has been run through an inverted one-hole rubber stopper. The stopper is then pushed tightly into the hole from inside the lid. This prevents pressure from blowing the stopper out of the lid. Thermometers should be tested for accuracy at temperatures used in canning.

Boiling-water-bath canner.—A boiling-water-bath canner, used with fruits and acid vegetables, is a container deep enough to permit covering cans with at least an inch of water. It should have a tight-fitting cover to expedite heating. A wash boiler makes a satisfactory water-bath canner if equipped with a “false bottom” or rack, to keep cans from direct contact with the bottom of the boiler.

Lye bath.—A lye bath in an enameled iron or alberene tank fitted with a steam coil is useful when large quantities of peaches or sweet-potatoes are being packed.

Large kettles.—For blanching or precooking foods before filling cans, for heating water, and for preparing sirup or brine, use large kettles of noncorrosive metal.

Exhaust box.—In canning large quantities of food without precooking an exhaust box is necessary. It can be purchased, or it can be constructed from galvanized iron, if the services of a good mechanic are available. A traveling belt carries the cans through the box. A steam line on each side of the cans placed about 1 inch above the bottom of the box has openings at 2-inch intervals, which send jets of steam obliquely against the sides of the cans. The length of the exhaust box is dependent on the output of the plant. It must be large enough to maintain high temperatures in all filled cans while air is being driven out before sealing. A loosely fitting lid for the exhaust box is desirable when water is the heating medium, and is essential when steam is used. A box of this kind is used not only for the exhausting process, but, when the food is precooked, to coordinate the filling and sealing of the cans and keep the food from cooling before it is sealed.

Sealers.—Heavy-duty hand sealers are adequate for small centers. Where daily production is high an electrically operated sealer is recommended. Manufacturers' directions for sealer adjustment should be followed very carefully. Sometimes a mechanically minded neigh-

borhood man may be trained to do expert servicing. Sealers should be tested carefully every day. To a defective sealing process, many a canning center has traced its greatest food losses. Get a good sealer.

For Large-Scale Canning

Before setting up a large-scale canning center, using factory-size retorts, with cranes for lifting, it is advisable to study an efficient commercial lay-out. Equipment for heavy duty is necessary. The WPA, in its large canning ventures, lists the following as minimum essentials:

Steam boiler carrying required volume of steam at not less than 35 pounds pressure, with connections to retorts, exhaust boxes, and blanching vats.

Exhaust box of a commercial type with capacity for exhausting maximum number of cans to be processed daily.

Steam pressure retorts, with total capacity to meet maximum daily requirement, piped with steam and water and equipped with thermometer, compound pressure gage, and safety valve. Automatic controllers and recording thermometers are desirable. It is advisable to pipe steam pressure retorts for pressure cooling, and they should be equipped with 1/8-inch petcock for "bleeding" retort and "blowing down."

Retort baskets or crates to hold cans of size to fit retorts.

Crane and hoist for lifting cans into and out of retorts and vats.

Tanks and vats for blanching produce before packing and for cooling cans, with steam and water connections, drain, and overflow outlet.

Blanching baskets of steel wire, lined with galvanized iron mesh hardware cloth.

Power-driven sealers.—These may be leased from can companies at a small rental.

Floor trucks for moving produce, cans, equipment.

Help in planning for necessary equipment or in financing its purchase may be obtained from a local REA Cooperative. These co-ops are prepared to promote and assist in establishing food centers in the rural areas which they serve.

Provision for Workers

In making provisions for the workers in the food preservation plant it is important that tables be of the right height for working without undue tiring, that chairs have comfortable backs, and that there should be enough equipment.

Work tables.—For work tables, the following measurements are recommended:

Height for standing work, 34 to 36 inches.

Height for sitting work, 27 to 28 inches.

Knee room 15 to 18 inches.

From 2½ to 3 feet of table space should be provided for each worker engaged in paring and cutting fruits and vegetables. Galvanized iron is a material often used for table tops; however, the zinc it contains affects acid foods, and care must be taken to keep cut surfaces of fruits and acid vegetables from contact with it. Hard wood treated with an acid- and alkali-resistant dressing makes a satisfactory table top. Heavy linoleum may be used to cover rough tables. It makes a good working surface and gives satisfactory service if cared for properly. Table tops may be made to drain by sloping each side of the working surface a little toward the center. The central trough then may lead to garbage cans, tubs, or other waste disposal. Shelves or tracks for cans may be built over the center of the table. An upper sloping track will carry empty cans by gravity, while the filled cans may be pushed along a lower track toward the sealers.

Chairs.—Workers engaged in activities that permit them to be seated should be provided with chairs. Sturdy wooden chairs with backs are preferred. Boxes and crates are not considered adequate for health and safety of workers.

Sinks.—A sufficient number of sinks or metal tanks or vats (which are preferable) should be provided for washing produce, dish-washing, and cleaning activities. It is desirable to have separate units for these purposes. Laundry tubs make good vegetable sinks.

Containers.—There should be a sufficient number of containers to hold prepared fruits and vegetables so that every worker at the preparation table has easy access to one.

Garbage and trash cans should be placed at convenient locations in the center. They should be of metal and watertight and should have close-fitting covers. When filled, the cans should be placed at least 50 feet from the plant. A tightly screened enclosure will be helpful in keeping flies and other pests away.

Fire extinguisher.—If wood or coal is used as fuel, and no oil, gas, or gasoline used in the building, two CO₂-expelled water extinguishers will be adequate, or if a reliable source of water is available, a suitable pump and hose will be sufficient. If oil or gas is used as fuel, one 15-pound Dugas, dry-powder type hand fire extinguisher should be installed in addition to the water extinguishers.

Containers for Canned Food

Tin cans.—For most foods there are advantages in using tin cans as containers in food preservation centers. The output is larger, since more containers can be processed in a given length of time. The initial cost is less. Heat penetration is better, and the process-

ing period is accordingly shorter. Tin cans may be water-cooled; hence there is less overcooking of products. No loss of liquid occurs during the processing. Tin cans may be stored to better advantage. Three kinds of tin cans are available:

PLAIN TIN CANS.—These are used for most fruits and vegetables and for meats and poultry. Some foods cause a chemical reaction to occur in plain tin cans and the food becomes discolored.

C ENAMEL CANS.—These are used principally for corn and for lima beans, peas, and other legumes. They should not be used for acid fruits and vegetables or for meats which contain fat since these foods will cause the enamel to peel off.

R OR SANITARY ENAMEL CANS.—These should be used for red-meated fruits and vegetables to prevent bleaching of color. Pumpkins, squash, sauerkraut should be canned in these cans to prevent corrosion.

Contrary to popular belief, there is no danger from food poisoning from tin cans. Plain cans may be used for all products where C enamel and R enamel are not available. But while there is no danger of food poisoning, can interiors will discolor in varying degrees according to the products processed. The food may also be discolored more or less, making it less appetizing.

CAN SIZES.—Usual sizes of cans for home use are No. 2, No. 2½, and No. 3. Hotels and institutions use No. 5 and No. 10.

Size:	<i>Content in cupfuls</i>
No. 2-----	2½
No. 2½-----	3½
No. 3-----	4
No. 5-----	7
No. 10-----	13

Gaskets used in sealing cans may be of composition rubber or paper. The rubber gasket rather than the paper is usually preferred.

In ordering cans state size, type of enamel, and type of gasket. Buy only first grade tin cans.

Glass jars.—Most foods may be canned in glass jars. Products which are covered with a liquid essentially vinegar, such as pickled beets, should be packed in glass. Rhubarb is very corrosive of tin; therefore it should be canned in glass. Strawberries are likely to fade even more in sanitary-enamel cans than in glass. When using glass jars for canning, the following precautions should be observed:

Chipped jars should not be used since they will not permit proper sealing.

Lids should fit exactly. Screw-top lids may be tested. Put about a cup of hot water into jar; put rubber in place. Screw on top. Invert to test for leaks. The same test may be used for glass tops but never for vacuum-seal type lids with composition edge.

New, good-quality jar rubbers are essential.

Quart jars should be the largest size used for canning nonacid vegetables.

Sterilization of jars, lids, and rubbers is essential if a water bath is used for processing.

Partial List of Manufacturers of Home-Canning Equipment

PRESSURE CANNERS* (STEAM)

American Aluminum Ware Co., 370 Jelliff Ave., Newark, N. J.

Burpee Can Sealer Co., 128 West Liberty St., Barrington, Ill.

Dixie Canner Co., Inc., Little Rock, Ark.

National Pressure Cooker Co., Eau Claire, Wis.

Robins, A. K., & Co., Inc., 111 Concord St., Baltimore, Md.

Sechrist, Albert, Mfg. Co., 1917 Logan, Denver, Colo.

The Pressure Cooker Co., 338 Broadway, Denver, Colo.

Wisconsin Aluminum Foundry Co., Inc., Manitowoc, Wis.

LARGE-SCALE CANNING EQUIPMENT

Ams, Max, Machine Co., City Line, Bridgeport, Conn.

Anderson-Barngrover Div., Food Machinery Corp., San Jose, Calif.

Ayars Machine Co., North Salem, N. J.

Berlin Chapman Co., Berlin, Wis.

F. H. Langsenkamp Co., Harmon & South Sts., Indianapolis, Ind.

Robins, A. K., & Co., Inc., 111 Concord St., Baltimore, Md.

Sprague-Sells Div., Food Machinery Corp., 101 E. Maple St., Hoopeston, Ill.

WATER BATHS, RACKS, JAR HOLDERS, ETC.

Hamblin & Russell Mfg. Co., Inc., Worcester, Mass.

Kerr Wire Products Co., 933 N. Cicero Ave., Chicago, Ill.

Rochester Can Co., 100 Greenleaf St., Rochester, N. Y.

TIN CANS

American Can Co., New York Central Bldg., New York, N. Y.

Atlas Can Corp., 241 Wythe Ave., Brooklyn, N. Y.

Continental Can Co., Inc., 100 East 42d St., New York, N. Y.

Dixie Canner Co., Inc., Little Rock, Ark.

Eagle Can Co., 356 Mystic Ave., Somerville, Mass.

Heekin Can Co., 6th and Culvert, Cincinnati, Ohio

Independent Can Co., Howard and Ostend Sts., Baltimore, Md.

Pacific Can Co., 290 Division St., San Francisco, Calif.

Phillips Can Co., Cambridge, Md.

Western Can Co., 17th & Rhode Island Sts., San Francisco, Calif.

SEALERS FOR TIN CANS

Ams, Max, Machine Co., City Line, Bridgeport, Conn.

Burpee Can Sealer Co., 128 West Liberty St., Barrington, Ill.

Dixie Canner Co., Inc., Little Rock, Ark.

National Pressure Cooker Co., Eau Claire, Wis.

National Aluminum Mfg. Co., Peoria, Ill.

Wisconsin Aluminum Foundry Co., Inc., Manitowoc, Wis.

CANNERS' LABELS

Fuller Label & Box Co., Fuller & Dargan Sts., Pittsburgh, Pa.

Higgins & Collmar, Inc., 38 Ferry St., New York, N. Y.

Kalamazoo Label Co., 321 W. Ransom St., Kalamazoo, Mich.

R. J. Kittredge & Co., 712 W. Superior St., Chicago, Ill.

Maryland Color Printing Co., Holliday & Hillen Sts., Baltimore, Md.

United States Printing & Lithograph Co., 318 Beech St., Rochester, N. Y.

PACKERS' GLASSWARE

Anchor Hocking Glass Corp., 500 Pierce St., Lancaster, Ohio
Armstrong Cork Co., 1010 Concord St., Lancaster, Pa.
Ball Bros. Co., Ryan & Burt Sts., Muncie, Ind.
Cupples Co., 7th & Spruce Sts., St. Louis, Mo.
Fairmount Glass Works, Inc., Keystone Ave. & Belt Ry., Indianapolis, Ind.
Florida Glass Mfg. Corp., Jacksonville, Fla. (bottles)
Foster Forbes Glass Co., Marion, Ind. (bottles)
Glass Containers, Inc., 3601 Santa Fe Ave., Los Angeles, Calif.
Glenshaw Glass Co., Inc., Glenshaw, Pa. (bottles)
Hart Glass Div., Dunkirk, Ind.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Indiana Glass Co., 152 Charles St., Dunkirk, Ind.
Kerr Glass Corp., Sand Springs, Okla.
Olean Glass Co., Inc., Olean, N. Y.
Owens-Illinos Glass Co., Toledo, Ohio.
Owens-Illinois Pacific Coast Co., 15th & Folsom Sts., San Francisco, Calif.
Tygart Valley Glass Co., Washington, Pa.

RUBBER RINGS

Acme Rubber Mfg. Co., 1938 Lambert St., Trenton, N. J.
Ball Bros. Co., Ryan & Burt Sts., Muncie, Ind.
Boston Woven Hose and Rubber Co., P. O. Box 1071, Boston, Mass.
Cupples Co., 7th & Spruce Sts., St. Louis, Mo.
Goodrich, B. F., Co., 450 S. Main St., Akron, Ohio.
Jenkins Bros., 80 White St., New York, N. Y.
United States Rubber Co., Mech. Goods Div., 1405 Rockefeller Center, New York, N. Y.

CAPS FOR GLASS JARS AND BOTTLES

American Can Co., New York Central Bldg., New York, N. Y.
Anchor Cap and Closure Corp., 500 Pierce St., Lancaster, Ohio.
Ball Bros. Co., Ryan & Burt Sts., Muncie, Ind.
Bernardin Bottle Cap Co., Inc., Evansville, Ind.
Kerr Glass Corp., Sand Springs, Okla.
Phoenix Metal Cap Co., 2444 W. 16th St., Chicago, Ill.

SUPERVISING THE CENTER

It would be impossible to lay too much stress on the necessity of competent supervision of community food preservation centers. If untrained persons are assembled to work with perishable foods and to use unfamiliar equipment without expert guidance and control, there is certain to be waste of material and time. And there is grave danger of menace to health through the botulinus poisoning that may arise in meats and nonacid vegetables when improperly processed.

Competent supervision means a smooth-running plant, high morale of workers, all operations well done. The success of the project and the product lies, in large measure, in supervision. Know what you are looking for in a supervisor or manager. Know where to look for a trained, competent person.

Supervisor or Manager

Qualifications.—Competence in the person in charge of a community food preservation center means technical food preservation knowledge and experience, business ability, and personal integrity.

Other qualifications necessary to success of the center are: Ability to maintain harmonious working relationships with others since the supervisor or manager must work harmoniously both with the advisory board and the community using the center; ability to direct others and follow directions; enthusiasm, initiative, good judgment; ability to meet emergencies.

Where to look.—Such qualifications are likely to be found among former home demonstration agents, former home economics teachers, former commercial canners, and the canners trained in the WPA canning program. If funds permit of a supervisor and assistant supervisor, it is often of advantage to have one of them a man with some engineering experience to aid with setting up equipment and repair and maintenance of heavy-duty machines. In United States communities there are many people competent to put odds and ends of this and that together and make an exhaust box.

Fixing responsibility.—If the center is run by a manager paid by WPA, he is responsible to WPA for the technical competence of the center. If he is a supervisor paid by the advisory board, he is responsible to the advisory board. A written agreement stating what is expected of him, his duties and responsibilities, hours of work and salary is recommended. When his term of duty expires, he should turn over the center in good order to the advisory board. These things should all be thoroughly understood at the time of hiring.

Duties.—The supervisor or manager is responsible for:

Assigning duties to workers

Training workers in correct methods

Keeping records of produce coming in, products going out, business done

Ordering supplies and planning storage of supplies and products

Reports to the advisory board

Health and safety precautions

Cleaning and care of equipment

Uniform adherence to rules

Organizing the Jobs

Setting work standards.—Regardless of the size of a community food preservation center, it will be necessary to make a careful analysis of the jobs to be done in order that the unit may be efficiently operated for quality and quantity production. Every effort should be made to organize and lay out the various jobs so that an orderly

and continuous flow of work can be maintained. The technical supervisor should in every instance set the work standards and determine the specific methods of all canning operations. Without careful guidance and control of all phases of canning operations, there will be waste of time and materials, which will result in low production, excessive unit costs, and possible spoilage of canned products. To avoid waste of perishable materials before canning and to minimize danger of spoilage after canning it is necessary that work be scheduled so that all perishable foods are canned while fresh and in prime condition.

Assigning daily duties.—Daily duties to be assigned in the canning process include :

Scheduling deliveries of food to be canned.

Receiving and checking produce.

Removing husks, stems, and other waste.

Washing products.

Preparing products for canning:

Peeling, paring, slicing, chopping.

Cleaning or washing of containers and equipment.

Checking mechanical and steam equipment.

Blanching or precooking produce.

Filling containers.

Exhausting cans that are filled with cold food.

Sealing containers.

Processing.

Cooling.

Marking cans.

Storing cans.

Disposing of garbage and waste.

Sterilization of waste containers.

Cleaning and sterilization of all working surfaces.

Cleaning floors.

Cleaning outside premises.

Training the Workers

A high standard of performance on the part of the workers is essential to make the organization effective.

Job directions.—Supervisors should prepare work plans for each job. These should be simple and specific in order that workers may easily understand them. Assignment of jobs should be made in relation to the ability of the workers.

Training on job.—The supervisor or manager should endeavor to cultivate in all workers an attitude of cooperative responsibility and help them, through constant training on the job, to develop desirable work habits, such as :

Following directions accurately, to insure good results.

Keeping work areas in order and work surfaces clean at all times.

Using time- and labor-saving methods of work.

Sweeping or mopping floor immediately, when anything is spilled, to avoid accidents.

Washing hands frequently as a sanitary measure.

Using hand towel instead of dish towel for drying hands.

Avoiding unnecessary conversation.

Avoiding all accident hazards and reporting all conditions likely to develop into hazards.

Record Keeping

Records are essential to the success of the center. They will differ according to the size and type of the center. The following are suggested for the average-size center:

Producer's agreement.—This agreement between the families and the center management sets forth rules and regulations of the canning center including toll percentages that may have been decided upon.

Patron's receipt.—This is a small perforated receipt to a patron for products delivered. It is made by the checker at the time of delivery. A carbon copy is retained by the center.

Appointment blank is to be used by the supervisor or manager in scheduling a plan of work for each day. Items for this record should include name and address of patron, amount of product to be brought in, hour of delivery, size and kind of can or jar, by whom furnished, toll agreement, other supplies to be furnished by the patron.

Manager's record blank shows date, name, address, kind, quantity, condition of product delivered to center, number and size of cans or jars canned. This may be broken down into number of cans retained by center and number of cans delivered to owner.

Financial records.—A set of books should be kept showing money paid out for equipment, supplies, wages or salaries, repairs and upkeep; also money received.

Specimen

PRODUCER'S AGREEMENT

I hereby agree to observe all rules and regulations of the food preservation center, and agree that such products as may be delivered by me for canning may be graded, culled, or rejected; if labor for canning is provided by the center, I agree that the center will retain ----- percent of the canned products as toll; and I will receive the remaining ----- percent of such products.

Signed -----

Approved -----

(Supervisor)

PATRON'S RECEIPT

Condition of product

Signed _____
Checker

DAILY APPOINTMENT BLANK

Date _____

[illegible]

MANAGER'S RECORD BLANK

[illegible]

Health and Safety Precautions

Health.—The health of the consumer of the product should be protected. Community food preservation centers should ask cooperation of local health officers, for regulations for people handling food, and for plant inspection if possible. Laundry should be done outside the center.

Health of workers should be protected likewise. Overheating is the greatest danger in canning centers. A thermometer should be available at all times for registering room temperatures of working stations, and regular checks of such temperatures should be made. People engaged in hot work need to drink lots of water. A sanitary drinking fountain or individual paper cups for drinking water for the workers must be provided. Ten-grain salt tablets should be made available in a suitable dispenser attached to the water fountain. The use of a common dipper, cup, or glass must never be tolerated.

Safety.—The nature of canning operations calls for careful observation of all safety practices if accidents are to be prevented. Precautions to be particularly observed follow:

Manufacturers' directions for installing, operating, and cleaning all cannery equipment should be closely followed.

All retorts, boilers, pressure canners, and other equipment should be tested frequently.

Only trained, experienced workers should operate retorts, pressure canners, and other steam equipment and mechanical devices of all kinds.

All slicing or chopping of products should be done on a cutting board if mechanical equipment is not used for this purpose.

Every precaution should be taken against slipping on wet floors. Floors should be frequently mopped and kept free from peelings and other particles of food.

Precautions should be taken against burns from steam, hot water, and hot containers.

First-aid kit: A standard first-aid kit must be in readiness, and the services of a person certified as competent to administer first aid must be available to all workers. All injuries sustained by workers while in line of duty should be reported in accordance with prescribed procedure of the State. A special tannic acid burn kit should be furnished for large plants and those using steam boilers.

Cleaning and Care of Equipment

General cleaning.—A high standard of cleanliness must be maintained in all food preservation processes since the quality of food is affected by the conditions under which it is handled. The processes normally recommended for a particular product may not be adequate to insure safety if food becomes contaminated by harmful micro-organisms before it is preserved. A good standard of housekeeping requires that all rooms occupied by the community food preservation center be kept clean and in order at all times.

FLOORS should be free from litter and excess water. A thorough scrubbing or mopping is necessary at least once a day. In large steam canneries floors should be flushed with water during each shut-down period; that is, during meal hours and at the end of the day. In one meat-canning plant a pressure pump equipped with special cleaning guns using boiling water is employed to wash everything once a day.

WALLS should be wiped down weekly to remove dust and should be washed as often as necessary to keep them free from grime. Woodwork should be kept free from dust and finger marks. Walls and woodwork should be painted as often as required to keep them in a sanitary condition.

CUPBOARDS, shelves, and drawers should be well organized and kept in good order. They should be thoroughly cleaned at least once a week.

WINDOWS should be washed frequently because of the steamy atmosphere of canneries. Screens should be kept free from dust.

Care of equipment.—Special attention should be given to the care of canning equipment, since spoilage of canned food may often be traced to contamination through carelessness in cleaning the equipment with

which it comes in contact. Manufacturers' instructions should be followed in the case of mechanical equipment. All equipment should be thoroughly cleaned at the end of each day's operation. This includes dismantling, scrubbing, and steaming all mechanical equipment. This equipment should be left cold and dismantled until the beginning of the next day's run and should be well flushed with cold water before using.

STEAM PIPES should be set up so that they may be easily drained and cleaned. Perforated steam-supply pipes should be carefully blown out during the cleaning operation.

WOODEN SURFACES should be cleaned with special care. Since they are porous, they easily become infected with bacteria which may cause food spoilage. Wooden equipment and work tables should be scrubbed with hot soapy water to remove dirt and grease, followed by scalding water, or treated with steam if a steam line is available. Hypochlorite solutions (sodium, calcium, or potassium hypochlorite) are good disinfectants for wooden surfaces. They should be used after the soap and water cleansing.

METAL-TOP TABLES should be washed with hot soapy water and rinsed with hot clear water so that they will dry without rusting. Mineral oil should be applied to the table tops at the end of each day's operations to prevent rusting. Other oils such as olive oil and motor oil, will impart flavors to the foods.

METAL UTENSILS should be washed with soapy water, rinsed, and sterilized by immersion for 3 minutes in water at a temperature not lower than 170° F. or in a chlorine solution. Utensils of corrodible metal, such as iron, galvanized iron, and copper, should be thoroughly cleaned before as well as after each use to remove surface corrosion.

PRESSURE GAGES should not be immersed in water. Methods recommended by the manufacturer for care of pressure gages and safety valves should be followed.

TIN CANS should be washed in soapy water, rinsed, and drained, unless the manufacturer gives instructions to the contrary. Lids should not be immersed in water. They may be wiped with a damp cloth, but gaskets, especially paper gaskets, should be kept dry to avoid difficulties in sealing.

SEALERS should be kept clean and oiled. To assure proper adjustment they should be checked at frequent intervals during the day's operation by one person who has been assigned to that responsibility. An inexperienced person should never be trusted to adjust the sealers. Directions for testing and oiling sealers, as given by Grace I. Neely, Texas extension specialist in food preservation, follow:

To check seal with wires: Check the machine by using the gage wires. For making detailed inspection of a seam, complete Operation 1 and stop. This first operation roll should look like a wire tightly drawn around a can. Should

there be wrinkles around the base, the seam is too loose and the first roll should be tightened. Next, complete the sealing by using the second roll. This final operation should flatten the rolled edge flatter than was done by the first roller.

To test seam with file: To file a can use an ordinary 10-inch steel file. Lay the can on the side and by using a corner of the file, file a V slot about $\frac{3}{4}$ inch from the seam of the can. This V cut should be entirely through the rolled edge.

Next set the can on end and file the top of the completed rolled top through the first thickness of tin. This filing should be about 2 inches long, being 1 inch on each side of the seam or where the can sides were joined together.

Next take your file and break the portion you have just filed loose from the adhering side of the can.

The small hook that is in the can, and also showing on a piece of the lid just broken loose, should measure at least $\frac{1}{16}$ of an inch to be an exceptionally good seal. If there is little or no hook you have a poor seal.

To oil: If automatic sealers are used a heavier oil than ordinary machine oil should be used for the inside worm gear. SAE 90-grade grease is ideal. All machines should be oiled with any light machine oil each half day, if used almost constantly.

Requirements for Workers

Absolute cleanliness of person and clothing is essential for all food handlers and should be required in community food preservation centers. This means following the rules of personal hygiene down to the last detail. In most centers it has also meant the wearing of uniforms, usually white so that they will not become unattractive as a result of being laundered after each day's wear.

Uniforms for workers.—At present volunteers engaged in food preservation are really enlisted in the army of defense. The Bureau of Home Economics has worked out a series of practical designs for women's work outfits to be used in various defense activities. These are carefully designed along functional lines, yet they are attractive and generally becoming.

A dress or coverall apron plus blouse worn with a cap or hair net constitute the generally prescribed canning uniform for women. A comfortably styled shirtwaist dress with full-length, snap-fastened front was designed by the Bureau for this purpose. Comfortable also is a surplice-style housedress, or a princess-cut coverall apron that may be worn over a dress or with a blouse.

Trousers, jumper, cap, and butcher's apron have proved a satisfactory uniform for men.

Hygiene rules.—The following personal hygiene rules have been put into practice in community food preservation centers:

- Only wash clothing should be worn in a canning center. All workers should wear caps.
- No worker should sit or lie on any bench, table, trough, or shelf intended for the food.

- No worker or visitor should use tobacco in any form where food is prepared or processed.
- Workers should keep fingernails short, should wash hands before commencing work and after each absence from the center.
- No person affected with any contagious or infectious disease should handle food. Workers who have colds should stay off duty. In some States a food handlers' certificate is required.
- Use of paper tissues instead of handkerchiefs is desirable. These may well be provided by the center.

Possibilities for Posters

Every community food preservation center should make use of posters, not only to save time and misunderstanding, but also as a means of education on the place that food plays in national defense.

Write your State nutrition committee for educational posters.

Placards that should be prominently displayed in places where they will help along in the day's work and save the supervisor's time, may well include the following:

Schedule for center: Working days; hours; days assigned to each commodity under the time-saving system of canning only tomatoes one day, only beans another.

State sanitary regulations for canning plants and all special regulations.

Directions for operating canners.

A clock-face device with hands set at time processing period will be finished, for timing canner. Such a device should be placed on the wall back of each canner.

Timetables for processing.

Rules for care of equipment.

Rules for cleaning and care of waste.

Sample canning budget.

Statement of toll to be levied for use of equipment.

SURPLUS SAVING PROCESSES

Each step that this country takes now to save food will be influenced more or less by the defense situation. Though canning has long been the stand-by of the thrifty American housewife in giving her family variety coupled with food values, the aluminum shortage has brought a sharp curtailment of pressure canners for the processing of meats and nonacid vegetables. This may necessitate turning to freezing for the preservation of meats and to brining or krauting for cabbage and turnips. Shortage of zinc for glass jar tops for fruit may be the signal for drying of apples and peaches.

No rule can be laid down for what food-saving processes are to be used as a means of helping along in the defense of this country. It is a matter of meeting situations as they arise, with the advice then offered by the nutrition committees, the defense organizations, and the State agricultural colleges.

The community food preservation center should serve as a place where people can come to find out the latest and best information on food preservation for defense, the right technical advice for their food preservation problems, and the actual equipment to deal with as many of them as possible.

A group of long experience in community food preservation conferred on the possibilities of food preservation centers for defense. It was their considered opinion that canning would continue to be the chief operation performed in the typical center; that freezer lockers would be organized as a specialized project in connection with some centers; that fresh foods should be distributed by bringing them to the center and sending them out by routes planned in cooperation with school and welfare authorities; and that while some drying, pickling, and storing would be done cooperatively as community enterprises in connection with the center, it would probably often prove practical to have some of this work done at home by processes recommended by the center.

Of the many food preservation processes, it is wise to choose those that can be done by the simplest methods with the most saving of food values.

Distribution Fresh

Fruit and vegetables contain their maximum food values when eaten fresh. Obviously it is to the advantage of this country in this emergency situation not to waste fresh foods and to get them to the people who need them. The Government has done this on a vast scale and with tremendous success through the Surplus Marketing Administration. The SMA machinery, dealing with marketings in truckload and carload lots, is not geared to save the small home-garden surpluses. It is easy to say that such surpluses should be saved. Actually doing it is not an altogether simple matter. It is hard to get these foods picked, hard to get them together, hard to distribute them in such a way that they go to the people in need of them for bringing their diets up to the accepted nutrition levels.

Surpluses develop almost overnight. Sometimes a whole season changes when it is well on its way, and families find out they have grown much more than they need for themselves. The word goes out, "It's a good year for beans," or "It's a good year for peaches."

The end of the season usually brings a great influx of green tomatoes into any food preservation center. Be prepared for it. The

green-tomato crop may usually be turned into pickles or relishes. The tag end of the fruit season may be met by using the products that did not make the market in such products as grape catsup, apple butter, peach butter, and fruit purees.

Speedy action necessary.—When a surplus arises, it can't wait. Something has to be done about it right then. American people are sufficiently accustomed to working together on a community basis to rally quickly. The organization person on the advisory board of the community food preservation center, with the cooperation of the local nutrition committee, should be able to arrange for gathering, collecting, routing, and distributing food surpluses. The usual phrase for such organizing is, "I got right on the telephone."

The community food preservation center can help by distributing recipes for a wide variety of uses for the surplus product, by calling attention of the public to how good it is by poster, word of mouth, and newspaper and radio publicity campaigns, and by stimulating local effort to get these specialized surpluses to consumers in fairly close territory where a comparative scarcity exists.

For example, a report may come to a community food preservation center that cantaloups are being left to rot on the ground 20 miles away, rich and ripe, while the people of the town consume canned peaches. The problem of the center then becomes one of interesting the people of the town in eating cantaloup and saving their canned peaches for next winter, as well as of gathering up the cantaloups from the country and getting them to the people in the town.

Big crops have news value.—Give crops as they come along their proper news value. Get your community into the habit of thinking, "It's cherry time," "It's asparagus season" and go at a food with gusto at a time when its price is most reasonable and within reach of people of the lower-income levels.

Transportation of fresh fruits and vegetables, whether by volunteers or by trucks with paid labor, should be carefully scheduled, since it is important that the harvested product be transported with the least possible delay to avoid loss by spoilage. A definite agreement as to deliveries to school lunch or other community projects should be made, so that work will not be interrupted by delays in receipt of produce.

Fresh products so distributed might well be used in preparing community school or playground lunches or to give variety to the meals in local charitable institutions, in community kitchens in defense areas, and in relief and low-income families. A large number of rural and village families, as well as low-income city families, are still living on diets below the food values found to be essential for health and strength.

Canning

Canning is a method of using heat and airtight containers to preserve food as nearly as possible in the condition in which it is served when freshly cooked. It is a desirable and economical method of preserving foods so that their use may be distributed over seasons when they are not available fresh. Canned foods make possible a better balanced and more varied diet throughout the year.

Acid and nonacid foods.—For canning purposes, foods are considered as two groups according to the quantity of free acid they contain. The acid foods are tomatoes, fruit, pickled beets, and ripe pimientos. The nonacid foods include all other vegetables, such as peas, beans, corn, squash, and also meats and poultry.

The acid foods are processed at or near the temperature of boiling water (212° F.) in a water bath.

The nonacid foods must be heated or processed in a steam pressure canner at temperatures of 240°–250° F. by applying 10 to 15 pounds of steam pressure.

How many cans to the bushel?—While fruits and vegetables are still in their fresh state, the thrifty canner likes to figure ahead on the pack—how many cans of the processed food can be expected from the bushel. The following table gives this information as it was worked out in Texas, a State which has an extensive canning program under a wide variety of climatic conditions. All figures are approximate.

TABLE 2.—*Number of pounds and cans per bushel of principal fresh fruits and vegetables*

Product	Weight per bushel	No. 2 cans	No. 3 cans (quarts)
	<i>Pounds</i>	<i>Number</i>	<i>Number</i>
Apples.....	50	30	20
Apricots.....	48	25	18
Beans, lima.....	28	50	30
Beans, string.....	24	25	16
Beets.....	60	35	22
Blackberries ¹	60	50	30
Carrots.....	50	30	20
Cherries, unpitted:			
Unstemmed.....	56	40	25
Stemmed.....	64	45	30
Corn (green, sweet).....	72	40	30
Greens.....	12	7	-----
Grapes.....	48	30	20
Peaches (standard).....	50	25	18
Pears.....	58	45	30
Peas (unshelled).....	32	16	9
Plums.....	56	45	30
Squash.....	40	30	20
Sweetpotatoes.....	52	30	20
Tomatoes.....	56	22	15

¹ 24-qt. crate of blackberries, 36 lbs.

Steps in the Canning Process

Experienced people pooled their best judgment in this simple statement of the day's work in a community food preservation center in the canning season for fruits and vegetables.

Scheduling deliveries.—Appointments should be made in advance with the manager as to kind and quantity of food to be brought in for canning.

Receiving and checking produce.—Products should be received only between hours scheduled by the manager. It is suggested that the manager set a time limit each day for accepting food and observe it strictly so that processing may be completed and the plant cleaned before regular closing hours.

In checking-in produce, a record should be made of the name, address of family, amount, kind, and condition of the product. Directions for handling meats are given separately, following the discussion on fruits and vegetables.

Heating water.—In centers not equipped with steam a quantity of water should be heated the first thing each morning.

Preparing cans and jars.—Wash tin cans and glass jars in soapy water and rinse. Check glass jars for nicks and cracks. Discard imperfect jars. Use new rubbers or new composition caps. Where paper gaskets are used, take care not to wet tin lids. Code tin cans with a heavy lead pencil, using code symbols given on page 41. Glass jars may be marked with a glass pencil.

Preparing food.—Remove husks, stems, and other waste. Wash fruits and vegetables carefully. Prepare products for canning by peeling, paring, chopping, or slicing. Follow carefully directions given in State extension bulletins. Blanch or precook according to directions.

Fill containers with hot material, leaving head space as directed in the tables in this bulletin or in your State canning bulletins. By head space is meant the distance between the lids of the can and the contents. If cans are filled with cold food they should be exhausted by preheating food in the cans before sealing. This may be done in an exhaust box, by placing the filled but open cans in a bath of boiling water deep enough to come within 1½ to 2 inches of the tops of cans or by stacking open cans of food in a retort or pressure canner and heating in steam without pressure. It is important that the interior temperature of the can should reach 125°–190° F., depending on the product (see timetable) before sealing. Test frequently, by putting a shielded thermometer into the center of cans.

Seal containers.—Make sure the sealer is in perfect adjustment. In closing different types of glass jar tops use the manufacturer's directions.

Process.—Fruits, tomatoes, or other acid foods should be processed

in a hot water bath; all other products under steam pressure. For length of processing period see timetable.

Cool tin cans at once in cold water; glass jars in air out of drafts.

Label.—Use wrap-around paper labels the full height of the can, which are held on by wrapping one glued end over the other. Paper labels may be bought or cut from brown wrapping paper. A paper label facilitates handling and helps to protect the can from rust.

Storage for canned foods should be provided in a cool, dry place. Protection from light is necessary for foods in glass jars. A temperature of from 50° to 70° F. is best. Tin cans should not be stacked on a damp floor. For fuller information on storage arrangements see State bulletins.

Garbage disposal.—Since it is extremely important that a high standard of cleanliness and sanitation be maintained in canning centers, garbage should be removed at least once a day and garbage containers should be thoroughly washed and sterilized each time they are emptied.

Cleaning.—All equipment, working surfaces, and floors should be thoroughly cleaned at the end of each day's operation.

Practical Pointers

In each main step of the canning process, practical experience is a guide to saving time, minimizing waste, and producing a first-grade pack. The following section is a compilation of the experience of the Bureau of Home Economics, the Work Projects Administration food preservation program, and the canning programs of the Extension Service and the Farm Security Administration.

Checking fresh fruits and vegetables.—Products should not be gathered more than 2 hours before they are delivered to the plant. All vegetables should be young and tender, should be kept clean while being transported to the canning center, and must be packed so as to avoid bruises, wilting, and heating. Do not pack over 1 bushel per basket or box for transporting. Old or wilted products should not be accepted.

Beans or field peas to be canned as "snaps" must be crisp and tender, and the beans in the pod just beginning to form or not more than half matured.

Beans and peas to be canned as "shells" must shell easily, but not be so matured that they have lost their green color.

Greens should be young and tender, both in leaf and stem.

Sweet corn ears should be well filled with plump and milky kernels, well developed, but not over-matured.

Beets must be young and tender and usually not more than 1½ to 2½ inches in diameter.

Carrots must be young and tender and not more than 1½ inches in diameter.

Coding.—Each lot of food should be coded before processing, i. e., each can is stamped with code marks which identify it as belonging to a given lot, of a given kind, on a given date. Coding makes it possible after canning to trace the cans of any lot in which spoilage occurs. Use a carpenter's pencil for marking.

Code for marking :

Meats:

R—Roast	H—Hash
S—Stew meat	L—Liver
HC—Hamburger, coarse	T—Tongue
HF—Hamburger, fine	SS—Soup stock

Vegetables:

VC—Carrots	VT—Turnips
VS—Spinach	VCo—Corn
VP—Peas (English)	VK—Kraut
VB—Beans	VM—Mustard
VBt—Beets	VTT—Turnip tops
VO—Okra	VBT—Beet tops
VSq—Squash	VOi—Onions
VA—Asparagus	VSb—String beans
VWG—Wild greens	VSP—Snap peas
VPK—Pumpkins	

Fruits:

FP—Peaches	FAP—Apricots
FBB—Blackberries	FR—Rhubarb
FF—Figs	FT—Tomatoes
FC—Citrus fruits	FA—Apples
FPr—Pears	FPl—Plums
FG—Grapes	FCh—Cherries

Example: VB-7-20-41 means beans canned July 20, 1941.

These suggestions on checking and coding come from the Texas community canning bulletin.

Preparations for processing.—In its food preservation projects the WPA has worked out the following helpful information and suggestions on filling cans, exhausting, and sealing:

FILLING CANS.—Filling cans is an important step in both commercial and home canning. The proportion of liquid to solids varies with different foods. The liquid in a can helps to carry the heat to the solid materials and to expel the air from the can. Packing by weight may be desirable to obtain uniformity. If a can or jar is filled too tightly it interferes with sealing. The food must have room in the container for expansion during processing and to prevent bulging of cans from temperature and altitude changes. If cans are not sufficiently filled they will contain too much air. This may cause discoloration of the top layer of food. Slack filling sometimes

TABLE 3.—*Kinds of cans to be used for principal products*

Plain tin		C enamel	R or sanitary enamel	
<i>Fruits</i>	<i>Vegetables</i>	<i>Vegetables</i>	<i>Fruits</i>	<i>Vegetables</i>
Apples.	Asparagus.	Beans:	Berries.	Beets.
Apricots.	Beans:	Fresh lima.	Cherries.	Pumpkin
Peaches.	Fresh.	Dried kidney.	Currants.	Squash.
Pears.	Dried.	Corn:	Gooseberries.	
Pineapple.	Carrots.	Whole grain.	Pimientos.	
Tomatoes.	Greens.	Cream style.	Plums.	
Tomato juice.	Okra.	Peas, black-eyed.	Rhubarb.	
Fruit, ground.	Okra and toma-	Succotash.	Strawberries.	
Fruit, pureed.	atoes.		Tomatoes.	
	Okra, tomatoes,		Tomato juice.	
	and corn.			
	Peas:			
	Green, or			
	English.			
	Black-eyed.			
	Sauerkraut.			
	Vegetable soup.			
Meats and poultry.				

This table was worked out in the research laboratories of the Bureau of Home Economics.

causes internal rusting of cans and can distortion because of the air space.

EXHAUSTING.—Fresh foods contain air which must be driven out before the containers are sealed. Unless this is done, the canned products become discolored and lose a great deal of the natural flavor.

Exhausting may be done by blanching or precooking food before it is packed into the cans or by heating the cans after they are filled and before they are sealed.

The air is removed from beans, peas, and other nonacid vegetables by blanching. Immediately after being blanched, the products should be packed into cans and sealed for processing.

When the exhausting is done after the cold food is packed into the can, the open cans are given a heat treatment and then sealed. The time and temperature will vary with the product being exhausted. Tomatoes, fruits, and meats are exhausted by this method.

Tables giving time and temperature for exhausting various products may be obtained from manufacturers of cans, from the National Canners Association, or from State canning bulletins. Regardless of the method of exhausting, the temperature of a representative number of containers must always be tested immediately before sealing. Air is removed from food in glass jars during the processing period. This is possible because the seal is not completed until after processing.

SEALING.—At the time cans are sealed the contents must be hot.

This means that sealing must be done immediately after exhausting. The sealing temperature should be measured by inserting a thermometer at the center of the can. Glass jars should be sealed in accordance with the manufacturer's instructions.

The Boiling-Water-Bath Method

For the water bath, use a vessel deep enough to allow the water to come at least 1 inch above the top of the cans or jars. A rack should be placed in the bottom of the canner to allow free circulation of water underneath the cans or jars. Racks may be made of strips of wood, wire-mesh fencing, or a pie tin in which holes have been punched. Washpots and lard cans make very satisfactory water-bath canners.

Water in the canner should be hot before the glass jars or tin cans are placed in it to be processed. Check to see that the water is an inch above the top of the cans or jars. Do not begin counting time until the water boils. Water should boil continuously throughout the time required for processing. The required time is given in table 4. Add time in higher altitudes according to the rule for altitude, viz, increase the time 20 percent for each additional 1,000 feet. If, for any reason, the water stops boiling, additional time should be allowed.

It is important to be accurate in timing. It is therefore suggested that a timing device be used or a written record made.

When the processing time is completed, jars or cans should be removed from the canner. The seal on glass jars with rubber rings should be completed immediately if they were not completely sealed before the processing began. The self-sealing type of cap is tightened firmly before processing and requires no further adjusting when removed from canner. Jars should be left to cool in a place free from drafts; cans should be plunged at once into cold water.

Warning on water baths.—The water-bath method is not considered safe for canning nonacid products. This is because some kinds of bacteria go through a dormant or spore form and become very resistant to heat; whether foods are acid or nonacid makes a difference in the temperature and time required to kill these bacteria. When the foods are definitely acid, as, for example, fruits and tomatoes, all forms of bacteria are killed within a reasonable time at the temperature of boiling water. With the nonacid foods—such as meats and corn, peas, beans, and practically all vegetables except tomatoes—these heat-resistant bacteria can be killed with speed and surety only at the high temperatures obtainable in the steam pressure canner. If a pressure canner is not available, some other method of preservation, such as drying or brining, should be used.

The timetable to be used in connection with the water-bath method, as worked out in the laboratories of the Bureau of Home Economics, follows:

TABLE 4.—*Timetable¹ water-bath method for processing fruits, tomatoes, and other acid foods*

Product	Style of pack ²	Processing period in boiling water ³ (212° F.)			Type of tin can
		Pint and quart glass jars ⁴	No. 2 and No. 3 tin cans	Minutes	
Apples	{ Steam or boil to wilt; pack in hot sirup or water	Minutes	Minutes	10	Plain tin.
	{ Same as above but dry-pack	15	10	15	Do.
	{ Bake or boil whole; pack in hot sirup	20	15	5	Do.
	{ Applesauce, pack hot	5	5	5	Do.
Apricots	{ Pack raw; cover with hot sirup	25	{ No. 2, 15.		Do.
	{ Precook and pack hot	15	{ No. 3, 25.		Do.
	{ Pack hot	30			
Beets, pickled					
Berries:					
Blackberries					
Blueberries					
Dewberries					
Huckleberries	{ Pack raw, cover with hot sirup	20	15		Sanitary enamel.
Logan blackberries	{ Precook and pack hot	5	5		Do.
Raspberries					
Cherries	{ Pack raw; cover with hot sirup	25	20		Do.
Currants	{ Precook and pack hot	5	5		Do.
Figs	{ do	5	5		Do.
Gooseberries	Varies with locality. Ask State experiment station				
	{ Pack raw; cover with hot sirup	20	15		Do.
	{ Precook and pack hot	5	5		Do.
Peaches	{ Pack raw; cover with hot sirup	{ Soft, 25.	Soft, 20		{ Plain tin.
	{ Precook and pack hot	{ Firm, 35.	Firm, 30		{ Do.
		15	15		
Pears	{ Pack raw; cover with hot sirup		{ No. 2, 20		{ Do.
	{ Precook and pack hot		{ No. 3, 25		{ Do.
		20	20		Do.
Pimientos, ripe	{ Pack hot	Pint, 40	{ No. 9, 30		{ Sanitary enamel.
			{ No. 1, 30		

Pineapples-----	Pack raw; cover with hot sirup-----	30-----	25-----	Plain tin.
Plums-----	{ Pack raw; cover with hot sirup-----	20-----	15-----	Sanitary enamel.
Rhubarb-----	{ Precook and pack hot-----	5-----	5-----	Do.
Sauerkraut-----	do-----	5-----	5-----	Do.
Strawberries-----	do-----	{ Pint, 25-----	No. 2, 15-----	{ Plain tin.
Tomatoes-----	{ Pack raw-----	{ Quart, 30-----	No. 3, 30-----	{ Sanitary enamel.
Tomato juice-----	{ Precook and pack hot-----	45-----	35-----	{ Plain tin (pref.) or
	{ Pack hot-----	5-----	5-----	sanitary enamel.
		No proc-	5-----	Do.
Fruit, ground or pureed-----	Pack at 160° to 170° F. and process at 212°-----	essing.		
Fruit juices:		20-----		
Berry-----				
Cherry-----				
Currant-----				
Plum-----	{ Pack at 160° to 170° F. and process in water bath at 180°-----	20-----		

¹ The time given here for processing in the boiling-water bath applies only to places with altitudes of 1,000 feet or less. For all altitudes above 1,000 feet, the time should be increased 20 percent for each additional 1,000 feet.

² In glass jars, allow $\frac{1}{2}$ -inch head space. In No. 2 tin cans allow $\frac{1}{4}$ -inch, in No. 3 cans $\frac{1}{2}$ -inch head space. Solid materials should be covered by the liquid.

³ Before processing, exhaust tin cans 10 to 15 minutes, or until the temperature at the center of the can is 130°-140° F. Process the containers immediately after packing and exhausting. Cool the food in tin cans in cold water immediately after processing.

⁴ When half-gallon glass jars are used, add 3 minutes to times given for pint and quart glass jars.

Steam-Pressure Method

All canners of the steam-pressure type are made on the same principle; that is, they are designed to hold steam under pressure. This makes it possible to obtain a temperature higher than 212° F.

Enough water should be put in the canner to bring the level of the water just below the rack which holds the jars. If there are leaks where the steam escapes, additional water should be used to prevent the canner from boiling dry during the processing.

The glass jars or tin cans should be placed on the rack so that the steam may circulate freely around them. The lid on the canner should be fastened securely. The petcock should be left open to allow escape of any air which is in the canner. If the air remains inside, the desired temperature cannot be reached. On canners with less than 25-quart capacity, the petcock should be left open until the steam escapes in a steady stream for 7 minutes. For canners holding 25 quarts or more, the steam should escape from the petcock for 10 minutes. The petcock should then be closed and pressure allowed to rise to pounds and temperature required.

Counting of time should begin as soon as the pressure gage or the retort thermometer registers the required temperature. Allow for altitude by adding a half-pound pressure for every thousand feet above sea level. If possible, constant pressure should be maintained throughout the processing period by regulating the heat. Fluctuation of pressure has a tendency to draw the liquid out of the glass jars.

The canner should be removed from the stove after the products have been processed for the required length of time. When processing glass jars or No. 3 tin cans, the canner should cool until the pressure gage registers 0. After the canner has cooled, the petcock should be opened slowly to permit the escape of the steam. The lid should be removed from the canner by lifting it away from the face, otherwise the remaining steam may burn the person operating the canner.

When No. 2 cans are used, the petcock may be opened immediately after the canner is removed from the stove.

Containers should be taken out of the canner and cooled as quickly as possible.

Timetable.—The timetable for vegetables put up by the steam-pressure method follows:

TABLE 5.—*Timetable¹ for processing nonacid vegetables in the pressure canner*

Product	Preparation and packing ²	Temperature of jar or can when being sealed	Pint glass jars		Quart glass jars		No. 2 tin cans		No. 3 tin cans		Type of tin can
			240° F. ³	250° F. ³	240° F. ³	250° F. ³	240° F. ³	250° F. ³	240° F. ³	250° F. ³	
Asparagus-----	Tie in bundles. Stand upright with tough portion in boiling water; cover tightly and boil 2-3 min. Pack hot; add liquor in which cooked. Or pack raw in No. 2 tin cans, cover with boiling water, and exhaust 4-5 min. before sealing.	° F. 125-150	Min. 30	Min. 35	Min. 30	Min.	Min. 30	Min.	Min.	Min.	Plain.
Beans, fresh:											
Lima-----	Bring to boil in water to cover. Pack hot.	125-150	50	55	40	---	50	---	50	---	C enamel or plain.
Snap-----	Simmer 5 min. Pack hot; add liquor in which cooked.	125-150	30	35	25	---	30	---	30	---	Plain.
Soy-----	Bring to boil. Pack hot; add water to cover.	125-150	80	90	70	---	85	---	85	---	C enamel or plain
Beans, dry: Kidney or pinto.	Soak overnight. Blanch in boiling water 3-4 min. Pack hot in containers to about $\frac{3}{4}$ capacity. Add water to cover.	125-150	80	90	70	---	85	---	85	---	Do.
Beets:											
Baby-----	Scald or steam for about 15 min. Skin and leave whole. Pack hot; add boiling water to cover.	125-150	30	35	30	---	30	---	30	---	Sanitary enamel.
Mature-- --	Boil until skin slips easily. Skin and quarter or slice. Pack hot; add water to cover.	125-150	30	35	30	---	30	---	30	---	Do.

¹ The processing temperatures, pressures, and times given are for sea level. For places above sea level, use these times but increase pressures $\frac{1}{2}$ pound for each 1,000 feet.² In packing the containers, add salt in the proportion of 1 teaspoon per quart. In glass jars, allow $\frac{1}{2}$ -inch head space for nonstarchy foods, 1 inch for starchy foods (corn, peas, lima beans). In No. 2 tin cans, allow $\frac{3}{4}$ -inch, in No. 3 cans, $\frac{1}{2}$ -inch head space. Solid materials should be covered by the liquid.³ 240° F. corresponds to 10 pounds pressure; 250° F. corresponds to 15 pounds pressure.

TABLE 5.—*Timetable for processing nonacid vegetables in the pressure canner*—Continued

Product	Preparation and packing	Temperature, center of jar or can when being sealed	Pint glass jars		Quart glass jars		No. 2 tin cans		No. 3 tin cans		Type of tin can
			240° F.	250° F.	240° F.	250° F.	240° F.	250° F.	240° F.	250° F.	
Carrots-----	Boil 5 min. Pack hot; add water to cover.	° F. 125-150	Min. 30	Min. 75	Min. 35	Min. 70	Min. 30	Min. 70	Min. 30	Min. 70	Plain.
Corn:	Cut grains from cob and scrape cob. Add half as much boiling water as corn by weight. Heat to boiling and pack at once.	180-190									C enamel.
Whole grain-	Cut whole grains and do not scrape cob. Add half as much boiling water as corn by weight. Heat to boiling and pack at once.	180-190	60		70	50	65				Do.
Greens-----	Simmer in water for 5 min. Pack hot; add liquor in which cooked.	125-150		60				55	No. 2½ 60		Plain.
Okra-----	Cover with water, bring to boil; pack hot, add water to cover.	125-150	35		40	25	30		30		Do.
Okra and tomatoes.	Heat okra and tomatoes to boiling; pack hot.	125-150	25		35	25	30		30		Do.
Okra, tomatoes, and corn.	Heat okra, tomatoes, and whole-grain corn to boiling and pack hot. The processing times are for 3 parts tomato pulp to 1 part each of okra and corn.	125-150	35		45	35	40		40		Do.
Peas, shelled:	Simmer in water 5 min. Pack hot; add liquor in which cooked.	125-150	45			40					Do.
Green or English.	Bring to boil in water to cover.	125-150	50		55	40	50		50		Plain or C enamel.
Black-eyed--	Pack hot; add liquor in which cooked.										
Peas, snap:	Follow directions for snap beans----	125-150	30		35	25	30		30		Plain.
Black-eyed.											

Pumpkin-----	Peel and cut pumpkin into inch cubes. Add small quantity of water; bring to boil. Pack hot; add water in which cooked.	180-190	---	60	---	75	---	60	---	70	Sanitary enamel.
Squash:											
Summer-----	Cut squash into inch cubes. Follow directions for pumpkin.	180-190	---	60	---	75	---	60	---	70	Do.
Winter-----	Peel and cut squash into inch cubes. Follow directions for pumpkin.	180-190	---	60	---	75	---	60	---	70	Do.
Sweetpotatoes----	Boil or steam until skins slip easily. Skin, cut in pieces, pack hot. Add water to cover.	180-190	95	---	120	---	95	---	115	---	Do.
Vegetable soup mixtures.	Include 2 or more of the following: Tomato pulp, corn, lima beans, peas, okra, carrots, turnips, celery, and onion. Bring soup mixture to boiling point and pack hot.	180-190	60	---	70	---	50	---	65	---	Plain.

Methods for Meat Canning

During the drought of 1934 the Extension Service worked out practical methods in large-scale meat canning on a community basis. Most of the material which follows is taken from Texas bulletins. The timetable for pressure-cooker canning of meats was worked out in the laboratories of the Bureau of Home Economics.

Handling fresh meats.—Carcasses should be washed with cold water and wiped dry with a cloth before being transported to the cold-storage plant. Meat-canning centers should be located or selected at points where adequate refrigeration facilities are available.

The minimum period of cold storage for an animal of 500 pounds live weight is at least 18 hours when the temperature is 34° to 38° F., and at least 24 hours when the temperature is 42° to 46°. Above 48° to 50° is danger zone.

As a maximum the carcass should be allowed to remain in cold storage 2 or 3 days for ripening.

If the temperature of the storage plant is below freezing, the meat should not remain longer than 12 hours, or it will begin freezing.

If artificial refrigeration is not used and the animal is left hanging outside overnight, the temperature should reach 50° or lower for proper cooling.

A tag should be used to identify ownership of carcass and the containers of meat when they are placed in cold storage. This will help to prevent misunderstanding with the customer as to the number of cans charged for toll and return of customer's own product.

Plans should be made whereby producers may arrange with the food preservation center supervisor and the person in charge of the cold-storage plant for steady flow of adequately chilled meat to the canning center. This plan should prevent overloading the capacity of the center and yet furnish an adequate supply.

Thermometer should be provided for testing cooled meat as it is brought into canning center. The same thermometer can be used to check product in cans before sealing.

Refrigeration should be provided in plant to take care of meat delivered in quantities too great for rapid handling and processing.

Preparation.—Do not soak. Merely wipe off for cleaning. For roasts, the pieces of meat should be cut large enough to fit in the can after the shrinkage of precooking with the muscle fibre running lengthwise. Steak should be cut about three-fourths of an inch thick. The less tender parts may be cut into small cubes for stews.

Precooking and exhausting.—Precooking and exhausting the air are necessary parts of the processing of meat. Precooking is heating the meats in a kettle of water or broth until the red color changes to brown; exhausting is heating the cans of meat before sealing.

Closing temperature.—Meat should be at least 170° F. when sealed into the containers. This temperature is necessary to assure formation of vacuum in cooling. Actually test the pack frequently by putting a shielded thermometer into the center of a number of cans before sealing them.

Processing.—Process by the steam-pressure method before described, using the timetable for Meats and Poultry on pages 52 and 53.

Handling Processed Cans

Cooling.—Rapid cooling improves the quality of the pack. Slow cooling may cause overcooking or spoilage. Tin cans may be pressure-cooled or water-cooled. If they are pressure-cooled, water is admitted into the retort under pressure which approximates the processing pressure. This pressure is gradually reduced as the temperature falls. All cans over No. 3 size should be cooled by this method to prevent bulging and buckling due to too-rapid cooling. Manufacturers' directions for pressure cooling should be closely followed.

In water cooling the cans are cooled with cold running water as soon as they are removed from the retort or pressure canner. Only pure, clean water should be used for this purpose.

Cooling should lower the temperature of the contents below 100° F. Cans cooled to this temperature will ordinarily dry readily. If they do not dry from the heat of the can they should be wiped dry to prevent rusting.

Glass jars present a problem in cooling. They should be cooled in the air but not in a draft. They should not be inverted while cooling, but this should be done afterwards to test for leakage.

No attempt should be made to tighten screw tops after jars are cool since this practice is likely to break the seal.

Labeling.—Wrap paper labels around the full length of the can, firmly pressing one pasted end over the other. The label should show (1) contents, (2) net weight, (3) month and year of packing. Buy wallpaper paste or use the following recipe:

To 1 cup of flour add 1 cup of cold water and mix thoroughly. Add 2½ to 3 cups of boiling water, stirring to prevent lumps. Place on stove and bring slowly to boiling point; boil 5 minutes. Stir to prevent burning. When cooked, add 1 teaspoonful of powdered alum and half a teaspoon of oil of cloves. Pour into small glasses with covers.

Checking and storing.—Before produce canned in tin is distributed or stored it should be held at room temperature for at least 10 days. During this period some cans from each lot should be examined from time to time for evidence of spoilage. A final check should be made before they are stored permanently or distributed. This check should include:

TABLE 6.—*Timetable* ¹ *for processing meats and poultry in the steam-pressure canner*
250° F., OR 15 POUNDS PRESSURE

Product	Preparation and packing ²	Temperature at center of jar or can when sealing	No. 2 can	No. 2½ can	No. 3 can	Pint glass jar	Quart glass jar
Beef:		°F.	Min.	Min.	Min.	Min.	Min.
Fresh-----	Remove bone and gristle, leave only enough fat to give flavor. Precook and pack hot into glass jars or tin cans; cover with broth. Or, pack the meat raw into tin cans and exhaust the cans.	170	85	110	120	85	120
Ground-----	Pack raw meat tightly into tin cans and exhaust them. If canning in glass, mold into cakes, precook, pack hot, cover with broth.	170	90	115	---	90	120
Hash-----	Remove bone and gristle, cut meat into small pieces. Simmer in water, pack hot, cover with broth.	170	90	115	---	90	120
Heart and tongue--	Simmer tongue in water for about 45 minutes, skin, cut in pieces, pack hot, cover with broth. Remove thick connective tissue from heart, cut into pieces, simmer in water for about 20 minutes, pack hot, cover with broth.	170	85	110	120	85	120
Stew with vegetables.	Brown pieces of meat in beef fat, add onions, tomatoes, carrots, turnips, and potatoes; pack hot, cover with broth.	170	85	110	120	85	120
Corned-----	Parboil the meat to reduce saltiness, changing water several times if necessary; pack hot, cover with broth.	170	85	110	120	85	120
Chicken:							
With bone-----	Cut chicken into pieces for serving, precook, pack hot, cover with broth. Or, pack raw in tin cans and exhaust the cans.	170	55	65	70	65	75
Boned-----	Precook, pack hot, and cover with broth. Or, pack raw in tin cans and exhaust the cans.	170	85	110	120	85	120
Giblets-----	Can livers alone, and gizzards and hearts together. Precook in water, pack hot, cover with broth. Or pack raw in tin cans and exhaust the cans.	170	85	---	---	85	---
Sandwich spread--	Chop or grind cooked chicken, season to taste with spices (curry, mace, mustard), and olives and pimientos if desired. Add broth, heat to boiling. Pack hot.	170	90	---	---	90	---
Liver paste-----	Simmer livers 10 min.; mash with fork. Add mayonnaise and spices to taste. Pack hot.	170	90	---	---	90	---

Lamb and mutton-----	Follow the directions for Beef, fresh-----	170	85	110	120	85	120
Liver paste-----	Use beef, calf, lamb, or hog liver. Remove veins and membranes. Grind raw liver, season with onion, tomatoes and spices. Pack hot.	170	90	-----	-----	90	-----
Pork:							
Fresh-----	Remove fat from meat. Follow directions for Beef, fresh-----	170	85	110	120	85	120
Headcheese-----	Use hog's head, tongue, and heart. Pack headcheese hot into containers, preferably tin.	170	90	-----	-----	90	-----
Sausage-----	Follow directions for Beef, ground-----	170	90	115	-----	90	120
Rabbit, domestic-----	Follow directions for Chicken-----	170	85	110	120	85	120
Soups:							
Soup stock-----	Make fairly concentrated soup stock with bones and small pieces of meat. Remove excess fat and all pieces of bone, but do not strain out meat and sediment. Pack hot.	170	40	45	45	40	45
Broth, clear-----	Make fairly concentrated soup stock, remove excess fat, strain, and if desired, clarify with white of egg. Pack hot.	170	25	30	30	25	30
Broth with rice or barley-----	Add 1 cup of uncooked cereal to each gallon of boiling broth. Continue to boil 15 min., and pack hot.	170	35	40	40	35	40
Chicken Gumbo-----	Make chicken gumbo soup and pack hot into containers-----	170	65	75	80	65	80
Veal-----	Follow the directions for Beef, fresh-----	170	85	110	120	85	120

240° F., OR 10 POUNDS PRESSURE

Chili con carne-----	Grind lean beef, or beef and pork mixed, season with garlic and chili powder, add hot water and simmer about 10 min. Add chili beans which have been soaked overnight and blanched 5 min. in boiling water. Pack the mixture hot.	170	120	135	150	120	150
Pork and beans-----	Soak white navy beans overnight; blanch 2 min. in boiling water. Pack beans in a bean pot or baking dish, add salt pork, and tomato sauce or diluted molasses. Cover and cook for 1½ hours in slow oven (250° F.). Pack hot.	170	70	80	85	80	90

¹ The processing temperatures, pressures, and times given are for sea level. For places above sea level, use these times but increase pressures ½ pound for each 1,000 feet.
² In packing the containers, add salt in the proportion of 1 teaspoon per quart, placing the salt in the bottom of the container. In glass jars, allow ½-inch head space. In No. 2 tin cans, allow ¼ inch, in No. 3 cans, ½-inch head space. Solid materials should be covered by the liquid.

BUCKLED CANS.—Cans that have caved in, or collapsed, on the sides are called buckled cans. Buckling may occur when No. 3 or larger sized cans are cooled too quickly after processing. These large cans should be allowed to remain in the canner until the pressure gage has reached 0 to avoid too sudden change of pressure. Cans of smaller sizes when slack-filled sometimes buckle on cooling and break the seams. In this case the food should be put into other cans and reprocessed or else used at once.

SPRINGERS.—Springers are cans with bulged ends. The ends of cans generally become convex, or outwardly curved, during processing because of expansion of the food and the formation of steam. When the cans cool, the ends should snap back to a concave, or inwardly curved position. If a can is too full, the ends may not snap back into proper position, and the can is called a springer. Such cans should be marked so they will not be confused with those that become bulged during storage.

SWELLED CANS.—When gas is formed within a can it may cause the ends of the can to bulge. For example, some fruits, such as prunes, apples, and some berries, react with the metals of the can, and hydrogen gas is liberated. When this collects, the can may become a "hydrogen swell." In this case the food itself is not affected. However, in several types of food spoilage, gases are produced that cause swelled cans. For this reason bulged ends on a can are regarded as an indication of spoilage. When canned fruits show such a condition, they should be examined for other indications of spoilage. When a can of meat or nonacid vegetables has bulged ends the food in it should be disposed of by burning.

Canned food should be stored on shelves—not on the floor—and in a cool, dry place. The cans should be neatly stacked with ventilation space between them. For convenience, all cans of one kind of produce should be together, arranged with labels to the front.

Precautions.—Teach everyone who comes into your community food preservation center the proper precautions to use before tasting non-acid vegetables and meats when they come from the container.

Nonacid foods and meats canned in either tin or glass should not be tasted until they have been boiled at least 10 minutes in an open vessel. Smell the food carefully because heating brings out odors not otherwise detected.

If the product has an odor and an off taste after boiling, burn it. Do not feed it to animals or throw it in the yard.

Special Problems

What experienced canners have found out about special problems likely to arise in any community food preservation center follows:

Dark-brown products usually indicate overcooking.

Purple products indicate a combination of acid and pigment reacting with tin; this is not harmful if the flavor and odor are good, as sometimes observed in white fruits and vegetables.

Dark beans.—Beans often turn dark because of pigment in the bean itself. This may also discolor the pod and is especially noticeable in some forms of wax beans.

Dark okra.—Okra often turns dark because it has been in contact with iron knives or vessels or because it has come in contact with the iron of the can.

Imperfect beets.—Beets turn white because of the variety or because there were too great or sudden changes in temperature during processing, withdrawing the juices. Beets sometimes blacken on coming into contact with iron. White deposit in beets, pickles, etc., indicates use of hard water or free-running table salt.

Cloudy peas.—Peas turn cloudy because they were too mature or were seasoned with table salt or because of mineral in water or as a result of too full packs.

Brining and "Krauting"

When vegetables are placed in brine, juices and soluble material contained in them are drawn out by the force known as osmosis.

The fermentable sugar present in all fruits and vegetables, which is one of the soluble substances extracted by osmotic action, serves as food for the lactic-acid bacteria which break it down into lactic acid and certain volatile acids. In some vegetables, like cucumbers and cabbage, where the supply of sugar is ample and other conditions are favorable to the growth of the lactic bacteria, a decided acid formation takes place, constituting a distinct fermentation. The acid brine thus formed acts upon the vegetable tissues, bringing about the changes in color, taste, and texture which mark the pickled state.

For generations people have enjoyed crisp, tart sauerkraut made of cabbage. More recently turnip and lettuce kraut have become popular.

Brining

Vegetables may be preserved by the use of salt in the following three methods, recommended by the United States Department of Agriculture:

Fermentation in added brine.—Experiments have shown that string beans, green tomatoes, beets, chayotes, mango melons, burr gherkins, and corn (on cob) may be well preserved in a 10-percent brine (40° on the salinometer scale) for several months. Cauliflower and peppers are best preserved in a 60° brine and onions in an 80° brine. The brine must be maintained at its original strength by the gradual

addition of salt and the surface of the brine must be kept free from scum. Some of the vegetables listed, notably string beans and green tomatoes, are well adapted to fermentation in a weak brine (5 percent salt), in which case dill and other spices may be added.

Dry salting.—This method, of course, can be used only for vegetables which contain enough water to make their own brine. String beans, if young and tender, may be preserved in this way. Remove tips and strings, and, if the pods are large, break them in two. Older beans, and doubtless other vegetables, could be preserved by this method if first shredded in the same manner as cabbage. Use salt equal to 3 percent of the weight of the vegetables (1 ounce of salt to about 2 pounds of vegetables).

Salting without fermentation.—Enough salt to prevent all bacterial action must be added. Wash and weigh the vegetables. Mix with them thoroughly one-fourth their weight of salt. If after the addition of pressure there is not enough brine to cover the product, add brine made by dissolving 1 pound of salt in 2 quarts of water. As soon as bubbling ceases, protect the surface by covering with paraffin. This method is especially well adapted to vegetables in which the sugar content is too low to produce a successful fermentation, such as chard, spinach, and dandelions. Corn can also be well preserved in this way. Husk it and remove the silk. Cook it in boiling water for 10 minutes, to set the milk. Then cut the corn from the cob with a sharp knife, weigh it, and pack it in layers, with one-fourth its weight of fine salt.

The methods of preservation outlined are not limited to vegetables. Solid fruits, like clingstone peaches and Kieffer pears, can be preserved in an 80° brine for as long as 6 months. After the salt has been soaked out, they may be worked up into desirable products by the use of spices, vinegar, sugar, etc. Soft fruits, like Elberta peaches and Bartlett pears, are best preserved in weak vinegar (2 percent acetic acid).

Krauting

The following directions come from the Texas State bulletin, *Starring Kraut*, by Grace I. Neely:

Equipment necessary for making "kraut" includes a stone jar or keg with a capacity from 4 to 10 gallons; either hand shredding machine, electric shredder, slaw cutter, or sharp knife; cheesecloth or similar material, and large plate or board for covering the container; weight heavy enough to cause the brine to rise above the cover. A tightly sealed glass jug or jar filled with water or wet sand makes a good weight.

Avoid the use of iron or lime rocks for weights; these materials will

produce unpleasant brownish-black brine and prevent the desirable acid from forming.

Clean and scald all equipment to be used.

Secure a pure salt. Cheese or dairy salt will do. Use soft water for making brine when added brine is needed. When using water that can be softened by boiling, let it stand 24 hours to cool and settle. Skim off the top and pour off the water without stirring sediment in the bottom.

Cabbage.—Late cabbage varieties, preferably Flat Dutch or Ball Head, are recommended for kraut. Mature, sound heads should be selected.

To prepare the cabbage, remove all damaged or dirty leaves; then quarter the heads and slice off the core portion. Remember that washing the vegetables too thoroughly removes lactic acid bacteria needed for fermentation.

Weigh out 5 pounds of cabbage and 2 ounces of salt. Shred this cabbage directly into the jar or keg without exposing it to the air, for exposing it at any time reduces the amount of vitamin C in the fermented product and causes loss of color, texture, and flavor. Sprinkle the cabbage with 2 ounces of salt, bearing in mind that too much salt prevents fermentation of the product, and uneven distribution may cause red streaks in the brined product.

Prepare another 5 pounds of cabbage, weigh the 2 ounces of salt, and continue adding similar layers until the desired amount in the container is reached. Place uneven pieces of cabbage and a few large leaves on top. Cover with cheesecloth and plate or board; then place weight on top of the cover.

One pound of salt is required for 40 pounds of shredded cabbage.

Turnips.—Fall varieties of turnips make better sauerbraten than spring ones. Medium-sized turnips used as soon as possible after they are pulled give a better product.

Wash the turnips and rinse them in cold water; do not scrub them. Remove all the green part from the top; do not peel. Then shred as for cabbage sauerkraut; do not slice.

Shred 5 pounds of turnips, sprinkle them with 3 scant tablespoons, or $2\frac{2}{3}$ ounces of salt. Shred another 5 pounds of turnips, add 3 scant tablespoons of salt and continue forming these layers until the desired amount is reached. Cover with cloth, plate or board, and weight.

Lettuce.—In preparing lettuce kraut, cut out the core of the heads and cut the lettuce with a very sharp slicer or knife into even shreds. Care should be taken not to bruise the lettuce in cutting. As with sauerkraut or sauerbraten, the shreds should be as uniform as possible in length and thickness.

Shred five pounds of lettuce and through it evenly distribute 2 ounces of salt. Continue until the container is filled, cover with

the cloth, and weight as with sauerkraut. Forty pounds of lettuce will require use of 1 pound of salt.

Care during fermentation.—Keep shredded cabbage or lettuce and turnips under the brine. A scum will form on top of the brine in a day or two, and this should be carefully skimmed off daily, as it tends to destroy the acidity, break down the vegetable, and weaken the acid content.

When the weight and plate or board have been taken off, remove the cloth and the scum, and cover again with clean cheesecloth, then replace the plate or board and the weight. Wash out and boil the cloth daily, then dry it in the sun for use the next day.

The best temperature for curing is between 75° and 85° F., and this will require from 10 days to 3 weeks. Too-low temperature retards fermentation, and too-high temperatures during the curing period may cause ropy brine and spoilage of the product. When bubbles cease to rise, fermentation is complete.

Storage of kraut.—Two methods are used for storage of kraut.

Pour a layer of hot paraffin over the surface of the brined kraut to seal it. When the paraffin seal is broken, the kraut should be used in a short time or canned. Kraut will keep 1 or 2 years if the seal is not broken.

To can, pack the completely brined kraut into glass jars or tin cans. Before sealing tight, exhaust 8 minutes in the water bath or until simmering temperature or 180° F. is reached in the center of the container. Then seal at once and invert the cans. Cool quickly and store in a cool, well-ventilated place. If cool storage is not available, after exhausting and sealing, process pint jars and No. 2 plain tin cans for 10 minutes, quart jars and No. 3 plain tin cans for 15 minutes in a water bath.

For retaining the original fine quality of the kraut the product must be stored in a place that is not only cool and well-ventilated but clean, dark, and dry.

Cucumber Pickles

Brining is a good way to save surplus cucumbers that cannot be used or readily sold in the fresh state. Instead of letting them go to waste it is very easy to cure them, after which they may be held as long as desired.

Proper curing of cucumbers requires from 6 weeks to 2 months, or possibly longer, according to the temperature at which the process is carried out and the size and variety of the cucumbers. Attempts to use short cuts or to make pickles overnight, as is sometimes advised, are based on a mistaken idea of what really constitutes a pickle.

Curing of cucumbers is marked by an increased firmness, a greater degree of translucency, and a change in color from pale green to dark or olive green. These changes are uniform throughout the perfectly cured specimen. So long as any portion of a pickle is whitish or opaque it is not perfectly cured.

Pack the cucumbers in a 4-gallon jar and cover with a 10-percent brine. At the time of making up the brine, or not later than the following day, add more salt at the rate of 1 pound for every 10 pounds of cucumbers used. This is necessary to maintain the strength of the brine.

Cover with a round board or plate that will go inside the jar, and on top of this place a weight heavy enough to keep the cucumbers well below the surface of the brine.

At the end of the first week, and at the end of each succeeding week for 5 weeks, add one-fourth pound of salt. In adding salt always place it on the cover. If it is added directly to the brine, it may sink, as a result of which the salt solution at the bottom will be very strong, while that near the surface may be so weak that the pickles will spoil.

A scum, made up usually of wild yeasts and molds, forms on the surface. As this may prove injurious by destroying the acidity of the brine, remove it by skimming.

Send for your State bulletin on pickling.

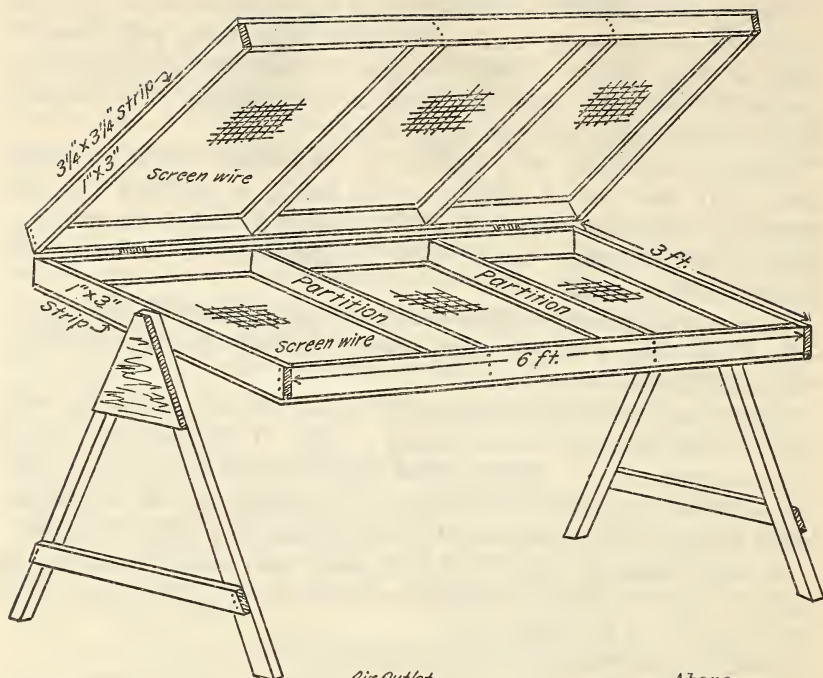
Drying

Only apples, apricots, pears, peaches, figs, corn, shelled green beans, and peas should be dried because keeping qualities and flavor of other dried products are not satisfactory.

In sections with a dry climate, the drying may be done out-of-doors in the sunshine; the material to be dried should be covered with screen wire or cheesecloth to protect it from flies and insects. In sections where there is much humidity, artificial heat must be used.

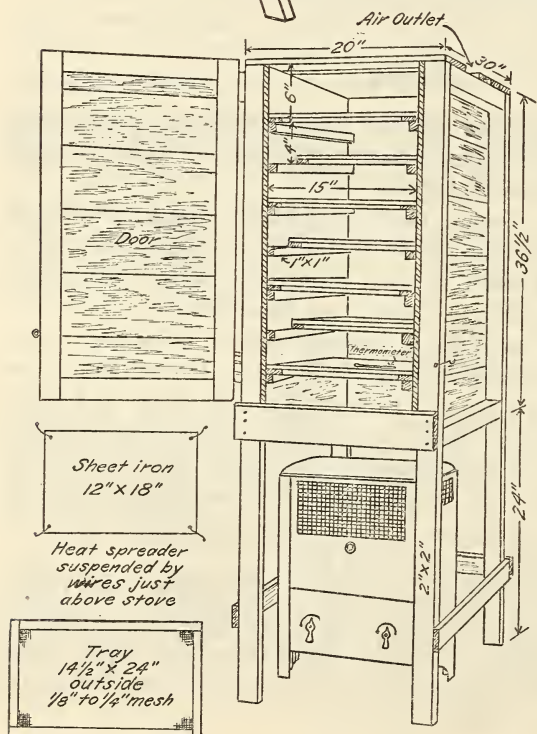
Dryers.—Instructions for making portable dryers to be used either in the sun or with artificial heat may be found in United States Department of Agriculture Farmer's Bulletin No. 984, Farm and Home Drying of Fruits and Vegetables, or in State agricultural extension service publications. The food-preservation center may own models of various types of home-made dryers which can be displayed for the purpose of encouraging families to make their own dryers for home use. Two types of dryers are pictured here.

Preparation.—The flesh of apples, peaches, pears, and apricots undergoes discoloration rapidly when the fruit is cut open and exposed to the air. The color changes are visible indications of the rapid chemical changes going on that injuriously affect the composition, flavor, and odor of the fruit if permitted to continue.



Above

FIG. 4.—Sun-drying screen trays for fruit and vegetables.



Left

FIG. 5.—Cabinet-type drier for fruit and vegetables.

Therefore, as the fruit is cut, it should be dropped into a vinegar and salt solution (1 tablespoon of salt and 1 tablespoon of vinegar to 1 quart of water).

To prevent further darkening while drying, the fruit may be exposed to the fumes of burning sulfur by placing the trays of cut fruit in a tight-covered packing box out-of-doors. In the bottom of the box sulfur is burned in an iron saucepan, 1 teaspoon of sulfur to 1 pound of the fresh fruit. This advice comes from Alabama Bulletin No. 139, *Drying Fruits and Vegetables in the Home*.

Vegetables must be dipped into hot water and then plunged into cold water before being dried.

Why dry foods at home?—For three reasons it is better not to carry on drying activities at the center. They are: Time consumed—drying does not require constant attention, but it is a long process; fuel expense—at home fuel used for cooking and heating can also be used in the drying process; moisture in the air from canning process delays drying.

Possible at center.—If there is a separate room available at the center that may be properly equipped, surplus products suitable for drying may be conserved that otherwise would go to waste if sufficient cans and jars are not available or if there is a shortage of labor.

Storing dried products.—Before dried fruits and vegetables are stored in tight, moistureproof containers such as glass jars, tin boxes, paper or cellophane bags, they should be heated for 10 or 15 minutes in the oven to a temperature of 160° to 180° F. or until they feel hot to the hand. Dried products should be kept in a warm, dry place.

In damp climates it is wise to store dried products in glass jars or cellophane bags, so that if moisture starts forming it may be detected immediately and the product reheated.

Send for Farmer's Bulletin No. 984, *Farm and Home Drying of Fruits and Vegetables*, and write to your State agricultural college for the State bulletin on drying.

Freezing

Quick freezing as a method of food preservation has come into commercial and community use in recent years. There are now 3,500 frozen-food locker plants operating throughout the country. To these lockers families take their home-raised surpluses or foods purchased at wholesale prices to have them processed in a sharp-freezing room and kept in lockers at near-zero temperature until needed for home use.

The great advantage of this process is that fruits and vegetables and meats are preserved with fresh flavor and full quota of vitamins and minerals kept intact. The greatest obstacle in its way is cost, since

rent of individual lockers which hold from 200 to 250 pounds of packaged foods ranges from \$8 to \$12 a year.

Products properly prepared and stored will keep in good condition for periods ranging from 9 months to a year. In communities where cooperative or commercial freezer-locker plants have been established, families who rent lockers go to them as they would go to a grocery store and take home a package of their own fresh-frozen peaches or strawberries, chicken or pork, string beans or peas, for a midwinter feast of their last summer's products.

A community possibility.—If the community food preservation center can be adequately financed and set up to operate on a year-round basis with trained supervision and experienced paid workers, the freezer-locker method should be thoroughly explored. As a means to excellent eating, it has many enthusiastic advocates.

Points in freezing.—Foods can deteriorate in freezer storage, and this new and promising commercial method of food preservation must not be regarded as a means for eliminating all the attention to detail and the work that is incident to proper canning and curing. As for other processes, foods must be of the proper quality and character when frozen if the thawed product is to be satisfactory. For example, it is important that fruits and vegetables be picked when table-ripe, be promptly and carefully handled, be hurried to the freezer before spoilage or loss of quality becomes serious. Vegetables must be steamed or scalded to preserve their natural flavor during storage, promptly chilled, packaged, and frozen. All varieties are not adapted to freezing preservation. Most frozen foods should be protected by a moisture-vaporproof carton or wrapper so that the ice will not evaporate from the surface during storage and render the product less palatable. All foods should be frozen promptly in a specially designed sharp freezer carrying a temperature of -10° F., or lower. Storage temperatures in a locker room should be held near 0 without wide variation either up or down. Thawing foods are wet foods and as such are subject to attack by spoilage organisms. It is, therefore, important that frozen foods be cooked promptly after removal from freezing temperature.

Storing

In all sections of the country it is possible to store a wide variety of fresh vegetables in root houses, storerooms, pits, trenches, or mounds. The root crops, such as potatoes, carrots, beets, onions, and turnips, are the most commonly stored vegetables. However, cabbage, pumpkins, and squash may also be preserved by this method. If vegetables are to be stored successfully they must be of good

quality and at the proper stage of maturity and must be stored at the correct temperature and the right degree of humidity.

Since storage conditions vary in different sections of the country it is necessary to secure information from authoritative sources on the approved methods of storage for a given locality.

Write to the United States Department of Agriculture for Farmer's Bulletin No. 879, Home Storage of Vegetables.

CLOSING THE CENTER FOR THE SEASON

Some community food preservation centers may operate on a permanent, year-round basis, serving as an educational center for nutrition when not in actual use in food preservation processes.

But most centers chiefly concerned with canning will come to the close of the vegetable-canning season and have a shut-down period until more fruits and vegetables come along or meat canning is entered upon.

It is well to remember that the community food preservation center belongs to everybody, and everybody's business is everybody's business. It is the responsibility of the paid supervisor or manager to see that the plant is properly closed, and the community should cooperate with him in this important matter. The procedure is as follows:

Inventory.—All equipment and stock on hand at the close of the season should be inventoried.

Sealers should be cleaned and oiled and put away in good condition to prevent rust from prolonged contacts with fruit juices and brine.

Pressure canners should be thoroughly checked over and their pet-cocks cleaned, the lugs around double-jacketed canners cleaned, and all screwing surfaces oiled.

Cleaning.—Walls, floors, work surfaces should be thoroughly cleaned.

Pipes.—Water should be drained out of all pipes, and the plant shut off.

Accounts.—All outstanding accounts should be settled.

Equipment list.—All equipment on hand should be listed, with written report notations as to its condition.

Windows and doors should be fastened securely.

Keys, books, and records should be turned over to the advisory board.

Records should include a complete summary of amounts of products canned, families served, money spent, and money earned.

SELECTED REFERENCES

United States Department of Agriculture:

- Home storage of vegetables. Farmers' Bul. 879.
- Farm and home drying of fruits and vegetables. Farmers' Bul. 984.
- Unfermented grape juice: How to make it in the home. Farmers' Bul. 1075.
- Farm manufacture of unfermented apple juice. Farmers' Bul. 1264.
- Making vinegar in the home and on the farm. Farmers' Bul. 1424.
- Making fermented pickles. Farmers' Bul. 1438.
- Home canning of fruits, vegetables, and meats. Farmers' Bul. 1762.
- Home-made jellies, jams, and preserves. Farmers' Bul. 1800.
- The commercial production of sauerkraut. Circular 35.
- Production of sauer rüben. Circular 389. (Commercial method.)
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- Preservation of fruits and vegetables by freezing in the Pacific Northwest. Bur. Chemistry and Engineering MC-53. [Mimeographed.]
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- Refrigerated food lockers: A new cooperative service. Farm Credit Admin. Cir. C-107.
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- Cold-storage lockers for preserving farm-dressed meat. Bur. Animal Industry A. H. D. 16. [Mimeographed.]
- Pork on the farm: Killing, curing, and canning. Farmers' Bul. 1186.
- Beef on the farm: Slaughtering, cutting, curing. Farmers' Bul. 1415.
- Lamb and mutton on the farm. Farmers' Bul. 1807.
- Nutrition centers: How to plan and equip them. Rural Electrification Admin. Defense Food Series. [Mimeographed.]
- Community buildings for farm families. Farmers' Bul. 1804.
- Surplus farm products. Where shall we find a market? Bur. Agricultural Economics DS 20.
- School lunches using farm surpluses. Misc. Pub. 408. (Quantity recipes and menu suggestions. Available only to leaders of school-lunch projects.)
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- Summer lunches for hungry children. Surplus Marketing Admin. SL 8.
- Diets to fit the family income. Farmers' Bul. 1757.

United States Department of Commerce:

- The home canning of fishery products. Bureau of Fisheries Investigational Report 34.

United States Work Projects Administration:

- Gardening and food preservation. W. P. A. Technical Series, Welfare Cir. 2. [Mimeographed.]

Write also to your own State college of agriculture for their publications on food preservation and on running community enterprises.



